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FOOD FOR THOUGHT: A STRENGTHS-BASED APPROACH TO EXAMINING THE
BIOMEDICAL AND PSYCHOLOGICAL HEALTH OF
LATINO MIGRANT AND SEASONAL FARM WORKERS IN GEORGIA

by

JOANNA WEINBERG

Under the Direction of Christopher Henrich, Ph.D.

ABSTRACT

Inherent in their living and working conditions, Migrant and Seasonal Farm Workers (MSFWs) are exposed to a multitude of environmental and psychosocial stressors that make them susceptible to adverse health outcomes. Utilizing a resilience framework, the current study examined both the physical and psychological health functioning of MSFWs in Georgia, a state heavily reliant on farm worker labor where relatively few research studies with MSFWs have been conducted to date. Based on a sample of 120 Latino, male, MSFWs in South Georgia, results indicated that approximately 1 out of 3 farm workers were at risk for iron-deficiency anemia. Similar to other psychological health studies conducted with MSFWs located in the Eastern U.S., the prevalence rate of depression in the current sample was elevated. MSFW stress was found to be a risk factor for psychological health and positive well-being and accurate farm

worker expectations were found to be assets associated with better psychological health outcomes. Farm worker expectations was also found to be a protective factor for physical health such that having accurate expectations buffered the relationship between MSFW stress and adverse biomedical health. Results show the usefulness of the resilience framework, and highlight the importance of establishing prevention, intervention, and policy efforts for MSFWs that aim to increase assets and minimize risk in this population.

INDEX WORDS: Migrant farm worker, Latino/Hispanic, Health, Resilience

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JOANNA WEINBERG

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of

Doctorate of Philosophy
in the College of Arts and Sciences
Georgia State University

2011

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Joanna Rose Weinberg
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August 2011

Dedication

This dissertation is dedicated to migrant and seasonal farm workers everywhere. May their struggles and resilience become a central focus in the minds, hearts, and consciousness of all U.S. Americans.

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First, I would like to thank Dr. Julia Perilla, my advisor, mentor, professor, advocate, and friend. This dissertation was made possible by your unwavering support and selfless dedication to this research. Your ability to close the chasm that often exists between the community and academia as well as your ability to effortlessly and naturally find the strengths in others is extraordinary. As an emerging clinical psychologist, it is my hope that I will be able to effectively incorporate your invaluable lessons in my work with both individuals and communities. Thank you Julia. My sincere and deepest appreciation to my chair, Dr. Christopher Henrich, who went well above the “call of duty” to be available to me throughout the completion of this milestone. Your dedication to students as well as your patience in explaining statistics is legendary and one in a million. I would also like to deeply thank Dr. Lisa Armistead and Dr. Gabriel Kuperminc for their continued assistance with this dissertation and for serving as excellent committee members.

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Introduction

Migrant and seasonal farm workers (MSFWs), many of whom migrate from Mexico and Central America, live under adverse circumstances and are exposed to numerous occupational and environmental hazards. Due to the nature and demands of their work, MSFWs face a multitude of physical and psychosocial stressors including poverty, substandard living conditions, malnutrition, exposure to hazardous chemicals, migrant status, separation from family, long work days, discrimination, and language and cultural barriers (Hansen & Donohoe, 2003; Magaña & Hovey, 2003; Arcury & Quandt, 2009). These adverse conditions can place MSFWs at increased risk for experiencing depression, anxiety, and stress; all of which can have serious physical health implications (Vega, Warheit, & Palacio, 1985; Magaña & Hovey, 2003; Hovey & Seligman, 2005; Grzywacz, 2009; Hiott et al., 2008).

Despite the dependence of the US on its agricultural products and, hence, on the people who work the land, MSFWs are an invisible population not only in the communities in which they live and work, but in their absence from the psychological literature. In Georgia alone it is estimated that over 100,000 MSFWs live and work in the state at some point during the year (Larson, 2008). This population, primarily males born in Mexico and Central America, is largely responsible for Georgia's 11.3 billion dollar agricultural industry (University of Georgia, 2009). Yet little is known about the psychological functioning and physical health status of these workers.

Extant psychological literature coming from California, Texas, Michigan, Ohio, and North Carolina suggest that overall, MSFWs have poor psychological functioning, with increased prevalence rates of depression and anxiety when compared to the general population

(Vega et al., 1985; De Leon Siantz, 1990; Hovey & Magaña, 2000, 2002b; Grzywacz, 2009).

Although limited, studies on the physical health status of MSFWs also indicate poor outcomes with MSFWs being at increased risk for chronic diseases such as heart disease, stroke, asthma, and diabetes (Villarejo, 2003; Villarejo et al., 2010).

Although there has been an increase in the volume of MSFW health outcomes research over the past 20 years (Hovey, 2001b; Villarejo, 2003), studies have largely focused on understanding this population using deficit-based approaches; a foci which highlights the presence of negative symptoms while ignoring positive attributes. For example, most studies have examined prevalence rates of psychological disorders, psychosocial risk factors associated with distress, and/or specific stressors inherent to the MSFW life. There are only a few studies to date that incorporate principles of resilience and examine protective factors that may buffer the difficult life and work conditions of MSFWs.

To this end, the present study utilizes a resilience framework to examine the psychological and biomedical health of MSFWs in South Georgia, a state where relatively little research with this population has been conducted. In addition to describing and better understanding the health of Georgia's MSFWs, this study addresses a gap in the research by identifying asset and protective factors that mitigate undesirable health outcomes in this population. Attention to factors that promote healthy development and functioning has the potential to inform policy and guide interventions and health care workers on how to work with the existing strengths of this community. Furthermore, although previous research has investigated the relationship between specific stress-related independent variables and psychological and self-reported ratings of physical health, this is one of the first studies

conducted with MSFWs to simultaneously examine correlates of both psychological health and biomedical health status as measured by physical exam.

To provide a context for this study, the literature review presents a background of what is already known about the lives and labor of farm workers in the United States and Georgia as well as existing gaps in the literature. The introductory section provides an overview of the demographic characteristics, and biomedical and psychological health status of MSFWs. The next section describes resilience and the framework that was utilized in the present study, followed by an overview of research that elucidates potential risk and asset variables associated with health outcomes among MSFWs. The literature review concludes by highlighting gaps in current knowledge and discussing how the present study aims to address them.

Literature Review

Migrant and Seasonal Farm Worker Definition

According to federal guidelines, a migrant farm worker is a person whose principal employment is in agriculture on a seasonal basis. This worker establishes a temporary home for purposes of employment. Whether it is from farm to farm, within a state, between states, or even crossing national borders, some sources estimate that migrant farm workers change locations between 11-13 times a year (NCFH, 2003b). Similar, but yet distinct from the migrant worker is the seasonal farm worker. This agricultural worker does not travel to multiple locations, but rather remains in one location throughout an annual farming cycle.

National estimates suggest that over half (57%) of the farm workers hired in the U.S. are seasonal farm workers, with the remaining workers migrating for employment (Carroll et al. 2005). Of the migrating farm workers, the majority are foreign born newcomers (38%) or

international shuttle migrants (30%), i.e., workers who travel internationally to a location and then work within a 75-mile radius of that locale. Although follow-the-crop migrants embody the popular concept of hired farm workers, national estimates indicate that only 8% of all hired farm workers “follow-the-crop” (Ageuirre International, 2005a), with the estimate being slightly higher at 13% for farm workers located in the Eastern regions of the United States.

Notably, these estimates do not include farm workers with H-2A visas. The H-2A visa program allows U.S. growers to hire foreign-born workers for a specified time period, normally less than one year. It purportedly benefits both U.S. growers and farm workers such that growers are able to legally secure needed workers, and farm workers are required to be provided set wages, housing that meets federal standards, transportation to and from worker’s home country or next working location, food security, and working conditions that meet all safety standards. In 2007, Georgia, with 6,781 workers H2-A certified, was the second leading H-2A worker state next to North Carolina (DOL, 2007).

Demographic Data on the U.S. and Georgia MSFW Population

Due to a number of factors including risks to revealing immigration status, varying migratory patterns, and social, economic, and language marginalization, it is difficult to accurately quantify and describe the United States’ MSFW population. Depending on the source, it is estimated that there are between 1 and 5 million MSFWs and their families living and working in the United States (Kandel, 2008; NCFH, 2003b). According to the National Agricultural Workers Survey (NAWS) conducted in 2002 (Carroll et al. 2005), the MSFWs in the U.S. are predominately young men (79% male, with an average age of 33 years). The majority identify as Latinos (84%), are born in Mexico (75%), and speak Spanish (81%). Of the male MSFWs, approximately 58% are married, roughly half have children (51%), and the

majority come to the U.S. unaccompanied by either a spouse or children (57%). The median education level is 6th grade and as such, literacy levels are low in both Spanish and English. Although farm workers are vital to the United States' multi-billion dollar agricultural industry, the majority of MSFWs earn annual wages under \$12,500 a year, with more than half of the MSFW households earning less than \$10,000 a year (Hansen & Donohoe, 2003). Notably, these earnings do not take into account the financial obligations MSFWs often have for family members in their home communities and the remittances that are typically sent by these farm workers (Vallejos, Quandt, & Arcury, 2009).

Roughly half (52%) of all hired crop farm workers lack legal authorization to work in the United States and as most growers do not provide any type of medical coverage to their farm worker employees, the majority of MSFWs are uninsured (Carroll et al. 2005). Furthermore, those workers who do qualify for federal assistance programs such as Medicaid, Food Stamps, WIC, etc., only qualify in one state at a time and must reapply in each state in which they work. Given the transitory nature of their employment, most workers have to move to another state before they can receive the benefits of these programs.

With regard to the MSFWs residing in Georgia, a thorough review of the published literature reveals that the last report detailing the demographic characteristics of this population was published in 1995 (Winders et al., 1995). According to this report, farm workers in Georgia were predominately unaccompanied, younger men from Mexico who had limited English proficiency. Most lacked transportation, worked long hours, received low wages, and were unaware of U.S. governmental resources. Although not a comprehensive state wide investigation, data collected through the Farm Worker Family Health Program (FWFHP), a two-week summer initiative designed to increase delivery of health care services for MSFWs and

their families in South Georgia, suggested that the majority of the population served by the program is either undocumented or working under the H-2A visa program (Connor, Rainer, Simcox, & Thomisee, 2007).

Migratory Streams

There are three main routes, also referred to as “migratory streams,” that MSFWs follow throughout a season. These include a West Coast stream, a Central U.S. stream, and an East Coast stream. Farm workers traveling the streams typically begin in the southern states during late fall and winter, and move “upstream” reaching the northern states by late summer or early fall. Migrants following the East Coast stream typically start in Florida and travel north through states east of the Appalachian Mountains including Georgia, the Carolinas, and Virginia, and end in New York and New England. However, given that only 8% of the farm workers nationally actually migrate by “following-the-crop,” the three-stream approach does not necessarily fit the description of the traveling patterns of most migrant farm workers. Thus, researchers have started referring to the regions in which MSFWs live (i.e., Western U.S., Central U.S., Eastern U.S.) when describing the population (Arcury & Quandt, 2009). MSFWs living in Georgia are thus considered to be located in the Eastern region of the United States.

Regional Differences

Several distinguishing features differentiate the regions in which MSFWs are located. With regard to agriculture, work in the Eastern U.S. is predominantly hand labor and focuses on harvesting crops common to the region such as apples, peaches, citrus fruit, berries, vegetables, mushrooms, Christmas trees, and tobacco (Arcury & Marín, 2009).

From a demographic perspective, although the number of Latinos living in the eastern regions of the U.S. has been rapidly growing in recent years, the Eastern U.S. is considered to be

a non-traditional receiving community as it does not have a historically large rural Latino population (Arcury & Marín, 2009). It has only been in recent years that Latino MSFWs have become the primary source of labor in the Eastern regions of the United States (Rothenberg, 1998; Arcury & Marín, 2009). Thus, Eastern Latino farm workers do not have the same levels nor quality of human services, social networks, and availability of resources that reflect their culture such as foods, recreational facilities, and Spanish speaking media, as might be found for those MSFWs living in the Western United States (Grzywacz, 2009).

Besides geographic, demographic, agricultural, and ethnic differences, other characteristics differentiate the regions. For example, when compared to MSFWs living in the Western U.S., MSFWs in the eastern region are more likely to live in housing provided by their employer; housing that is often found to be substandard and located in remote areas (Vallejos, Quandt, & Arcury, 2009). Also, in comparison to national estimates, there are a greater percentage of workers in the Eastern U.S. who follow-the-crop, are unmarried, and come unaccompanied as opposed to traveling with family (Aguirre International, 2005ab; Trotter, 1985). Taken together, these differentiating characteristics likely translate into a group of people more at risk for social isolation with fewer support resources and services available.

Physical Health of MSFWs

Due to a number of factors including the type of work they perform, environmental stressors, substandard living conditions, and limited access to healthcare services, MSFWs have been found to have poor physical health outcomes (Hansen & Donohoe, 2003). Specific health challenges faced by MSFWs include infectious diseases, chemical and pesticide-related illnesses, dermatitis, eye problems, hearing loss, sun and heat-related illnesses, respiratory conditions, musculoskeletal disorders, traumatic injuries, reproductive health problems, poor oral health, and

cancer (Villarejo & Baron, 1999; Villarejo, 2003; Hansen & Donohoe, 2003). Poor nutrition coupled with food insecurity (i.e., insufficient money to obtain sufficient food supply), obesity, high cholesterol, and hypertension are also prevalent and suggest that MSFWs are at elevated risk for heart disease, diabetes mellitus, and other chronic diseases (NCFH, 2003abc; Quandt et. al., 2004; Villarejo et. al., 2000). Not surprisingly, infant mortality rate is greater than the national average and life expectancy is considerably shorter (i.e., 49 years versus the national average of 75 years) (Sandhaus, 1998).

Several studies have documented the range of health challenges experienced by MSFWs in Georgia. According to an investigation conducted by the Georgia Migrant Health Program (1993), common health problems found in the Georgia MSFW population included hypertension, vision and dental problems, iron deficiency, tuberculosis, upper-respiratory infections, and gastrointestinal difficulties. Similarly, Tedders et al. (1998) found that hypertension, gastrointestinal problems, dental problems, musculoskeletal problems, and diabetes were the top 5 health related problems of MSFWs as reported by more than 200 physicians caring for MSFWs in Georgia.

Despite the high occurrence of illness, culturally competent, affordable healthcare services are not readily available for MSFWs working in the Eastern United States (May, 2009). Specific to Georgia, MSFWs have reported concern over the inadequacy of services offered (e.g., lack of specialized services, limited range of services, and lack of dental and eye care services), as well as barriers to accessing healthcare (e.g., transportation problems, fear of being deported, and prohibitive cost of medicine) (Perilla, Wilson, Wold, & Spencer, 1998). These prohibitive factors result in a population that often ignores or self-treats illnesses rather than uses conventional medical care (Arcury & Marín, 2009).

Measures of Physical Health

Much of the health services research conducted with MSFWs relies on self-reported health status as the sole method for assessing physical health (Ward, 2007; Villarejo, 2003). This method is advantageous in that it allows for the assessment of those aspects of health that are only known by the individual, such as level of pain. Commonly assessed with a one item question (i.e., “How would you rate your health?”), this means of measurement has the advantage of being easy and inexpensive to administer and has been shown to correlate with subsequent mortality (Ward, 2007).

Based on this one-item self-report measure of physical health, MSFWs have been found to rate their health as poorer when compared to the general U.S. population (Ward, 2007). In a study conducted with MSFWs in Wisconsin, 33.6% of the workers surveyed stated that they felt their health was “fair” or “poor” compared with 9.4% of the U.S. population. In contrast, 40.2% of the U.S. population said that their health was “excellent,” whereas only 13.3% of migrant farm workers felt they were in good health (Slesinger and Ofstead, 1993).

As in the general population, MSFW self-reported physical health is related to psychological health. Vega, Warheit, & Palacio (1985) were one of the first psychological researchers to use self-reported ratings of physical health with MSFWs. Findings revealed a significant relationship between self-report ratings of physical health and general psychological distress, such that MSFWs who reported their physical health as very poor, poor, and fair endorsed more psychiatric symptoms than those individuals who rated their health as good and excellent. Subsequent researchers have also found a similar inverse relationship between measures of psychological distress and self-ratings of physical health (Finch & Vega, 2003; White-Means, 1991).

Although there are advantages to using self-report measures of physical health, there are also disadvantages. For example, a self-report measure does not capture asymptomatic aspects of health such as high blood pressure. Given the difficulty of accessing this population, as well as the transient nature of their work, there are only a few cross-sectional health status studies that have included a physical examination as a means of measuring health data; one of them being the California Agricultural Workers Health Survey (CAWHS) undertaken in California in 1999 (Villarejo et al., 2010). Findings from this study suggest that overall, MSFWs have an elevated prevalence of biomedical indicators of chronic disease (i.e., high blood pressure, cholesterol, BMI, blood glucose, and low hemoglobin) when compared to the general U.S. and Mexican-American population.

Gap in MSFW Physical Health Literature

Given that self-report measures can overlook asymptomatic indicators of chronic health conditions, the inclusion of direct biomedical markers of health is warranted. Furthermore, given that no studies to date have been conducted with Georgia MSFWs that a) incorporate physical examinations as a method of measuring physical health; b) examine their biomedical health status and prevalence of risk indicators; or c) examine correlates of biomedical health, there is a great need to utilize biomedical markers when assessing and studying the physical health of this population.

Psychological Health

In addition to physical health outcomes, research over the past 25 years has chronicled the psychological health status of MSFWs. Although investigations in this area are sparse, overall findings indicate a population at great risk for experiencing psychological problems, with estimates suggesting that up to 50% experiences some type of psychological health difficulty

(Grzywacz, 2009). Notably, in addition to the detriments of poor physical health, indicators of poor psychological health such as elevated depressive symptoms and anxiety likely contribute to occupational injuries, decreased work productivity, and suicidal behavior (Grzywacz et al., 2010).

Prevalence Rates of Psychological Disorders.

In 1985, Vega, Warheit, & Pabacio conducted the first study exploring the psychological health of Mexican MSFWs (Vega, Warheit, & Pabacio, 1985). Using the Health Opinion Survey (HOS; MacMillan, 1957), Vega et al. found elevated levels of general psychological distress in a sample of 501 Mexican-American MSFWs located in Fresno, California. Although an important first step in documenting MSFW psychological health, Vega et al.'s use of the HOS has been cited as a major limitation (Alderete, Vega, Kolody, & Aguilar-Gaxiola, 1999; Hovey & Magaña, 2000; Hovey & Magaña, 2002b; Hovey & Magaña, 2002c; Magaña & Hovey, 2003). The HOS is a screening measure of general psychological risk, thus its resulting total score has functional limitations for differentiating specific psychological disorders. Consequently, most of the subsequent studies on MSFW psychological health have used measures that examine the prevalence of specific disorders and symptomatology; most frequently depression and anxiety.

Depression. With regard to depression, many of the studies in the MSFW psychological health literature have used the Center for Epidemiologic Studies-Depression Scale (CES-D; Radloff, 1977) to measure the prevalence of depressive symptoms. The CES-D provides a specific symptom threshold that designates “caseness” and individuals who reach this level of severity are considered to be at significant risk for depression and in need of mental health services.

Thus far, studies with MSFWs using the CES-D have typically found an increased prevalence of depressive symptoms when compared to the general population. For purposes of comparison, in the general population approximately 18% to 20% of people score in the depressed range on the CES-D. In one of the first studies using the CES-D with MSFWs, 41% of a sample of Mexican migrant farm worker (MFW) mothers located in Texas met caseness for depression (de Leon Siantz, 1990). Hovey and Magaña (2000) measured the prevalence of depressive symptoms in a sample of 45 male (n=25) and female (n=20) Mexican MFWs in Ohio and Michigan. In their sample, 38% of the individuals were deemed to be depressed and no differences in prevalence rates were found between the men and women. In another study by Hovey and Magaña (2002b), 39% of their sample of MFWs (N=75) in Ohio and Michigan scored as depressed. Again, no gender differences were found between the males (n=37) and females (n=38). In North Carolina, Grzywacz et al. (2006b) reported that 40% of their sample of 60 male Latino MFWs was depressed. Additional research conducted in North Carolina by Hiott et al. (2008) found that out of 125 male Latino MFWs, 42% met caseness for depression. Thus, for MSFWs living in central and eastern regions of the U.S., the frequency of individuals meeting caseness for depression as measured by the CES-D is 18% to 22% higher than the rates found in the general population.

Contrary to these relatively high depression levels, in a sample of 1001 Mexican men and women MFWs located in Fresno, California, only 21.1% of the men (n=500) scored in the depressed range on the CES-D; a rate more in line with the general population (Alderete, Vega, Kolody, & Aguilar-Gaxiola, 1999). Notably, California, with its relatively large Latino population and long history of employing farm workers from Mexico, is considered to be a traditional border receiving state. As such, well over a third (37.8%) of the total population

living in Fresno County at the time of the Alderete et al.'s study was of Mexican descent (U.S. Bureau of the Census, 2001). Given that the rates of depression for the MSFWs in the Midwestern and Eastern U.S. were elevated, ranging from 38% to 42%, it is possible that the sizable number of Latinos located in the Fresno area, coupled with California's status as a traditional receiving state translates into a greater number of available services and support networks.

Anxiety. Previous studies also suggest that MSFWs may be at risk for developing anxiety-related disorders. Many researchers have assessed the prevalence of anxiety symptoms with the Anxiety subscale of the Personality Assessment Inventory (PAI). Similar to the CES-D, the PAI has a designated symptom threshold which represents a potentially significant level of anxiety that may impair functioning. As measured by the PAI anxiety scale, impairment is thought to be present in 16% of the general population (Morey, 1991). Hovey and Magaña have used the PAI in multiple studies (2000, 2002a, 2002c, 2003) to assess the prevalence of anxiety symptoms in samples of MFWs located in Ohio and Michigan. In each of their samples, they found a relatively higher percentage of MFWs who reached the impaired range on the anxiety scale (i.e., 28% to 31%) than would be expected in the general population. Researchers in North Carolina have also used the PAI to measure the prevalence of anxiety symptoms in male MFWs and have found rates of impairment ranging from 17% to 39% (Grzywacz et al., 2006b; Hiott, Grzywacz, Davis, Quandt, & Arcury, 2008; Hiott, Grzywacz, Arcury, & Quandt, 2006).

In addition to the PAI, Alderete, Vega, Kolody, and Aguilar-Gaxiola (2000), used the Composite International Diagnostic Instrument (CIDI) to assess the lifetime prevalence of anxiety disorders in the 1001 men and women in Fresno mentioned previously. They found that 15.1% of the men and 12.9% of the women in their sample experienced an anxiety disorder at

some point in their life. Notably, these prevalence rates are markedly lower than those found in the general population (19.2% for men and 30.5% for women; Kessler et al., 1994), further supporting the likelihood of differential outcomes across geographic regions.

Ethno-specific illness. In addition to depression and anxiety, several studies have examined the prevalence of a number of ethno-specific diseases such as *nervios* (nerves), *aires* (headaches, dizziness, body aches, and/or fatigue caused by exposure to the cold when the body is warm), *susto* (fright illness caused by a traumatic event), *empacho* (gastrointestinal illness), *mal de ojo* or “evil eye” (hex caused by jealousy or envy of another that typically effects children), and *mollera caida* (sunken fontanel on a baby’s skull). In a bi-national (Mexico and U.S.) sample of 467 farm workers, Mines, Mullenax, and Saca (2001) found that 12% of respondents reported suffering from one of the above ethno-specific diseases. Of those affected, 20% reported experiencing two or more of these diseases during their lifetime.

Notably, *nervios* or “nerves” was cited in both the study previously mentioned (i.e., Bi-national Health Survey or BHS) and in the California Agricultural Workers Health Survey (CAWHS; Villarejo et al., 2000) as the leading ethno-specific disease affecting male respondents. *Nervios* is a condition characterized by both physical and affective symptoms including chest pain, shortness of breath, sweating, dizziness, difficulty concentrating, lack of coordination, insomnia, fatigue, trembling, body pain, gastrointestinal problems, generalized feelings of severe anxiety, a sense of desperation, bad mood, and anger/rage (Mines, Mullenax, & Saca, 2001; Bayles & Katerndahl, 2009; Mysyk, England, & Gallegos, 2008). Many of the somatic and affective symptoms associated with *nervios* are also commonly found for depression and generalized anxiety disorders. Although similar, *nervios* is considered by some to be a distinct construct and its presence is not always indicative of psychopathology. Rather, *nervios* is

understood as a “cry for help” and often a precursor to more serious psychological illness (Salgado de Snyder, Diaz-Perez, & Ojeda, 2000). Although the prevalence rate of *nervios* was not provided in either the BHS or CAWHS study, additional research has found prevalence rates ranging from 9.5% to 42.4% for men in the general Mexican population (Salgado de Snyder, Diaz-Perez, & Ojeda, 2000; Weller et al., 2008), 41% for MSFW residing along the US-Mexico border (Weigel et al., 2007), and 15.4% for Latino men in a convenience sample taken from a South Texas primary care clinic (Bayles & Katerndahl, 2009).

Gap in MSFW Psychological Health Literature

Although the amount of physical and psychological health research done with the MSFW population has increased in recent years (Villarejo, 2003; Hovey, 2001; Grzywacz, 2009), few published studies have been conducted with the MSFW population in Georgia. Of those that have been published, the foci of much of this research has been on physical health issues in MSFW adults (Perilla, Wilson, Wold, & Spencer, 1998) and their children (Wilson, Pitman, & Wold, 2000a), as well as descriptions of community health nursing experiences in the MSFW camps of South Georgia (Bechtel, 1995; Wilson, Wold, Spencer, & Pittman, 2000b; Connor et al., 2007; Connor, Layne & Thomisee, 2010). Given that MSFWs living in Georgia are likely to experience similar stressors and conditions as workers in other eastern region states, it is probable that prevalence rates of psychological conditions would be similar as well. However, no studies have been conducted to date examining the psychological health status of the MSFWs in Georgia.

Resilience

As illustrated in the above review, MSFWs are at increased risk of experiencing disease and disorder; however, there is still a large percent of MSFWs that are functioning well. For

example, although 40% of MSFWs in North Carolina met caseness for depression, 60% did not. Why are the majority of MSFWs functioning well despite exposure to significant adversity in their work and living environments? What are the factors that help to keep some protected from experiencing the effects of adversity? How do you improve the health, well-being, and functioning of more MSFWs? This line of questioning, while largely absent in the MSFW literature, is consistent with resilience theoretical models and research.

Resilience refers to the culmination of dynamic and multidimensional processes through which individuals exhibit good outcomes, despite the presence of adversity (Kupermine et al., 2009). Although once conceptualized as an anomaly, resilience is now better understood as being common; resulting from “ordinary” human adaptive processes (Masten, 2001).

Inherent in the definition, the construct of resilience is inferred based on two judgments: 1) in order for an individual to be considered resilient, he or she must be exposed to significant threat or adversity, and 2) the individual must function adequately despite the risk exposure (Luthar et al., 2000; Masten, 2001; Rutter, 2006; Wright & Masten, 2005). Although researchers have come to agreement about what constitutes a risk, there is a lack of consensus about how to define “adequate functioning” [e.g., is it the absence of negative symptoms or the presence of well-being and positive adaptation, (Duckworth, Steen, & Seligman, 2005)]. Luthar and Zelazo (2003) suggest that indicators of adequate functioning should be salient to and dependent on the population under study and that “good outcomes” can be understood as both the presence of health and the absence of disease. For example, Luthar and Zelazo (2003) suggest that it is relevant to examine the absence of psychiatric diagnoses rather than the superiority of functioning in children facing serious traumas. For a population like MSFWs who face

significant adversity on multiple levels, it is similarly appropriate to define risk evasion in terms of the absence of pathology or low levels of symptoms and impairment.

In variable-focused resilience models, emphasis is placed on elucidating potential risk, asset, and protective factors that are related to specified outcomes (whereas person-focused models concentrate on identifying individuals with resilient outcomes and comparing them to others who do not). As outlined by Masten (2001), risk factors are variables that have significant statistical links to negative functioning. Whereas assets variables are associated with better outcomes across levels of risk (i.e., main effects), protective factors are variables that interact with risk factors to reduce their negative influence on functioning (i.e., interactions).

Resilience in MSFW Research. As reviewed above, MSFWs are a population with elevated prevalence rates of psychological distress and poor physical health status. The harsh conditions of their work and life make them an appropriate population to study resilience; however, the majority of studies conducted with this population have taken a deficit-approach to understanding functioning; focusing on disease, prevalence rates of disorders, and indicators of distress.

Notably, risk and asset factors are usually continuous variables that can be conceptualized as two sides of the same coin (Masten, 2001). For example, in the MSFW literature social support has been identified as both a risk factor (i.e., those who have *low* social support are at *increased* risk of psychological distress) and asset (i.e., those who have *high* social support are at *decreased* risk of psychological distress). Thus, although researchers have identified variables that are inversely related to MSFWs' health outcomes and could be conceptualized as assets (e.g., social support, religiosity, etc.), MSFW researchers largely focuses on risks in their conceptualization of variables and in the presentation of findings.

Notably, only a limited number of studies have addressed the MSFW population's strengths and positive life functioning. One such study of resilience comes from a longitudinal study conducted by Parra-Cordona and colleagues (2006). Findings from a series of qualitative interviews with Latino migrant families in Michigan indicated that despite the many challenges inherent to the MSFW lifestyle, participants expressed positive perceptions of their lives. Notably, researchers found that participants' report of positive life aspects did not preclude them from exposure to the negative experiences associated with the migrant lifestyle, but rather suggested that participants were able to derive meaning from the adversity they faced. This was suggested by their high level of perceived life satisfaction as well as multiple reports of discrimination, work place injustices, and continuous relocation.

Although there are several studies to date that have identified indicators of well-being among MSFWs, to our knowledge, no studies have purposefully utilized a resilience framework, (i.e., identifying risk, asset and protective factors), to examine the psychological and physical functioning of MSFWs. Given that the study of resilience is promising and gaining wide support, a shift in focus will likely have direct implications for improving the lives of MSFWs.

The following sections will outline risk and asset variables that have been identified in the MSFW and extant literature as being associated with physical and psychological health.

Risk Factors: MSFW Stress. Various risk factors have been identified in the literature as being associated with increased levels of psychological distress and poor physical health among MSFWs including separation from family (Mines, Mullenax, & Saca, 2001; Lackey, 2008), social isolation (Lackey, 2008), acculturative stress (Alderete et al., 1999; Hovey & Magaña, 2000, 2002abc; Finch, Frank, & Vega, 2004), ambivalence/control over the decision to live as a MSFW (Salgado de Snyder, 1987; Hovey & Magaña, 2000, 2002abc; Grzywacz et al.,

2006b), and occupational hazards (Hansen & Donohue, 2003; May, 2009). MSFW stress (i.e., stress resulting from the stressors associated with the farm-worker lifestyle) is a risk factor that has gained attention in the MSFW literature in recent years.

Similar to findings from the general population, MSFW stress has been found to be related to depression, anxiety, *nervios* and poorer perceptions of physical health (Hovey & Seligman, 2005; Mysyk, England, & Gallegos, 2008; Ward & Tanner, 2010). One of the first studies to examine MSFWs' self-perceptions of experienced stressors was conducted by Magaña & Hovey (2003). Based on data obtained from in-depth interviews conducted with 75 MSFWs (38 female, 37 male), researchers identified 18 stressors commonly experienced by MSFWs in the Ohio/Michigan area and found that the stressors "rigid work demands" and "poor housing conditions" were significantly related to increases in anxiety (medium to large effect size) and "low family income/living in poverty" and "rigid work demands" were significantly related to increases in depressive symptoms (small to medium effect size). Findings from this study, were then used to create the Migrant Farm Worker Stress Inventory (MFWSI), a 39-item self-report instrument that assesses exposure to and the severity of stressors inherent in migrant farm work (the most recent version of the scale can be found at the author's website: <http://www.psimh.com/research-clinical-instruments>). In a sample of MSFWs located in western Colorado, greater stress scores on the MFWSI were linked to higher levels of hopelessness, depression, anxiety, and suicidality (Hovey & Seligman, 2005). In addition to negative psychological health outcomes, stress as measured by the MFWSI, has also been found to be related to decreases in health-related quality of life (Ward & Tanner, 2010).

Additional studies have used the MSFWI to determine which stressors inherent in farm work and the farm worker lifestyle contribute to poor mental health. For example, Hiott et al.

(2008) conducted a study with 125 Latino male MFWs located in east central North Carolina. Using the MFWSI, researchers found 5 discrete domains of stressors: legality and logistics, social isolation, work conditions, family concerns, and substance abuse by others. Of these specific categories of stressors, Hiott et al. found that both the stress of social isolation and working conditions was independently associated with increased anxiety and depression.

Mysyk, England, & Gallegos (2008) examined the precedents associated with *nervios* that are specific to the MSFW lifestyle. In their qualitative study with 30 MSFWs located in Canada, participants identified 5 causes of *nervios*. Similar to the findings on psychosocial stress predictors of depressive and anxiety symptoms, researchers found that the stressors: relocation, homesickness, communication barriers, aversive working conditions (i.e., time pressure, uncertainty, heat), and poor work relations (e.g., competition between co-workers), were related to the presence of *nervios*.

In addition to the established relationship between MSFW stress and psychological health, considerable evidence exists in the general population literature supporting the association between chronic stress and adverse physical health outcomes. For example, there is strong support for a stress-elicited increase in coronary artery disease (Cohen, Janicki-Deverts, & Miller, 2007). In a review of the literature Rozanski (2005) identified a number of stressors, such as limited social support, work stress, poverty, and racism that have been found to be linked to cardiovascular disease morbidity and mortality. Furthermore, in a meta-analysis conducted by Kivimäki and colleagues (2006), researchers estimated an approximate 50% increase in cardiovascular disease risk associated with high levels of work stress.

In addition to heart disease, findings from a meta-analysis conducted by Cohen, Doyle, & Skoner (1999) indicated that stressful events are also associated with changes in the immune

system. Psychological stress has not only been linked with an accelerated progression of HIV (Cohen, Janicki-Deverts, & Miller, 2007), but a positive relationship between stress and the occurrence of subsequent, relatively transient symptoms such as flu, sore throat, headaches, and backaches has been found as well (Cohen et al., 1998; DeLongis, Folkman, & Lazarus, 1988).

Specific to the MSFW literature, in a study conducted with 80 MSFWs located in Maryland, New Jersey, and Southeastern Pennsylvania regions, Ward and Tanner (2010) found a significant relationship between MSFW stress as measure by the MFWSI and diminished physical health. Other studies that have utilized the one-item measure of perceived health to explore the relationship between stress and physical health have had contrasting findings. For example, in a study conducted with 151 MSFWs in North Carolina, no significant relationship was found between MSFW stress and perceived health status (Kim-Godwin & Bechtel, 2004). Although a significant relationship between stress and biomedical indicators of physical health has been identified in the general population literature, this association has not been examined in the MSFW literature. Thus, using a multi-method approach (e.g., self-report measures and biomedical indicators) to assess the relationship between MSFW stress and physical health is needed in MSFW research to advance understanding in this area.

MSFW Asset Variables. In addition to risk factors associated with elevated psychological and physical health concerns, research suggests that the use of healthy coping strategies (e.g. religiosity) as well as contacting home frequently (Grzywacz et. al., 2006b) may influence workers' appraisal of stressors encountered in migrant farm work and may lead to reductions in stress, anxiety, and depression (Hovey & Seligman, 2005). For example, among recently migrated Mexican farm workers in North Carolina, Grzywacz et al. (2006b) found that men who called home frequently and had expressed ambivalence and concern about having left

their family in Mexico had less anxiety compared with those who were ambivalent but called less often. Similarly, as discussed previously, researchers have hypothesized that the divergent prevalence of depression and anxiety found across U.S. regions may be due to the differential support networks available in each area. The sizeable number of Latino's in the Western U.S. may translate into increased availability and prevalence of culturally supportive resources such as Spanish radio/television stations, availability of indigenous food, etc. Furthermore, Hovey & Magaña (2001, 2002abc) have consistently found that individuals reporting increased social support as well as increased connection to religion and spirituality have better psychological health outcomes. These findings are further supported by Finch & Vega (2003) who found that greater numbers of peers and family members in the U.S. as well as increased religious support helped protect against the harmful effects of discrimination on physical health. Thus, facilitating contact with family members in the homeland and increasing social ties in the U.S. migrant community through the use of church and/or positive recreational activities may help to buffer against some of the negative experiences inherent in the lives and labor of MSFW; especially those located in the Eastern United States.

Although support can be found in the MSFW literature for the benefits of social support, calling home, and religiosity, it is likely that there are additional asset variables that are related to decreases in negative health outcomes among MSFWs. One such variable may be eudaimonic well-being. This construct refers to an aspect of positive functioning based on self-acceptance, mutually beneficial and satisfying relations with others, personal growth, finding purpose and meaning in life, and a close alignment between one's general life activities with one's deeply held values (Ryan & Deci, 2001). Waterman (1993) suggested that people high in eudaimonic well-being will feel intensely alive and authentic, appreciating life's challenges, and exerting

effort and energy when encountering trying situations. Prior research with eudaimonic well-being has found a positive relationship with several indices of good health (Ryff et al., 2004), and Ryff and Singer (1998) have shown that eudaimonic living leads to the activation of particular physiological mechanisms that promote healthy immune functioning and robust health.

Positive Well-Being (PWB) has been described as similar to eudaimonic well-being. Based on six specific aspects of human attainment—autonomy, personal growth, self-acceptance, life purpose, mastery, and positive relatedness—and measured by the Positive Well-Being Scale (Ryff, 1989), PWB has been associated with various physical health outcomes as measured by diverse biomedical markers (Ryff et al., 2004). Findings indicated numerous significant inverse associations between PWB and adverse cardiovascular factors (e.g., weight, waist to hip ratios, cholesterol and HbA1c) and neuroendocrine factors (e.g. cortisol levels and epinephrine). Furthermore, under stressful conditions, Miquelon & Vallerand (2006) found that PWB promoted positive physical health. Similar to physical health findings, PWB has also been found to be negatively related to psychological difficulties (Ryff & Keyes, 1995).

Thus, given that in the general population, eudaimonic well-being/PWB has been widely found to be inversely associated with poor physical health outcomes and to protect against the adverse effects of stress, it is likely that PWB will serve as both a potential asset and protective factor in the MSFW population. Although there is considerable support and potential for its inclusion in MSFW research, there are no published studies to date that have assessed this construct in this population.

Another asset variable that has the potential to be negatively related to poor health outcomes is farm worker's expectations. In this study, farm worker expectations referred to what MSFWs expected work in the U.S. to be like. In other words, did the MSFW have accurate

expectations about their experiences or were things worse than expected? Taking a deficit-based approach, there is support in the MSFW research that farm workers whose experience were worse than expected may be at risk for increased psychological difficulties. For example, Mines, Mullenax, and Saca (2001) found that for many of the farm workers in their bi-national sample, expectations of life in the United States were greater than the reality. Although researchers did not quantify the relationship between unmet expectations and psychological distress in their study, support for this association was found by Vega, Kolody, and Valle (1987). Their findings indicated that frustrations surrounding unfulfilled expectations about economic efficacy were related to increases in depressive symptoms. Although both authors' findings suggest that unfulfilled expectations might be a stressor linked to negative psychological health outcomes, no studies have examined whether having accurate expectations is related to decreased levels of distress.

Gaps in MSFW Literature: Interaction Effects. Relevant to the examination of potential protective factors in the MSFW population, only a few studies have hypothesized and examined interaction effects (e.g., Grzywacz et al., 2006b; Hiott et al., 2008; Hiott et al., 2006; Finch, Frank, & Vega, 2004; Grzywacz et al., 2007; Finch & Vega, 2003). In a thorough review of the Latino MSFW literature only one study was found (i.e., Finch & Vega, 2003) to examine potential protective factors that buffer against the adverse stress-health relationship. Specifically, Finch and Vega (2003) found that social support moderated the (main) effect of discrimination on self-reported physical health. Aside from this study, no other studies were found that examined moderators of the stress-health relationship in this population (including acculturative stress, occupational stress and, relevant to this study, MSFW stress). Given the noteworthy stressors faced by MSFWs, coupled with the established relationship between stress and adverse

health in the examination of resilience within this population, identifying potential protective factors that buffer this deleterious relationship is imperative.

Current Study

There is a call to conceptualize MSFW health in a more holistic way (Ward, 2007) looking not only at the prevalence of illness, but at well-being and healthy development. As reviewed above, the majority of physical and psychological health studies conducted with MSFWs have examined the prevalence of disease and disorder; with few taking a strengths-based approach. In addition to the strengths-based gap in the MSFW literature, few published studies have been conducted with the MSFWs in Georgia. Given the unique stressors inherent to MSFWs living in Eastern regions of the U.S., it is essential to examine factors that may buffer the negative effects of MSFW stress on psychological and physical health. As such, the current study aims to utilize a resilience framework with the purpose of identifying factors that are associated with healthy functioning among Latino male MSFWs in Georgia. Furthermore, given the dearth of MSFW research that examines physical health using biomedical indicators, the present study utilizes a multi-method approach (e.g., self-report measures and biomedical indicators) when assessing the health status and correlates of physical health in this population.

Based on the gaps identified in the literature review, this study had the following objectives:

1. To present and describe the physical and psychological health status of MSFWs in South Georgia.

2. To *replicate, integrate* and *build upon* previous research to examine risk, asset, and protective variables that are associated with health outcomes in this population.

Hypothesis 1: Risk and Asset Predictors of Health Outcomes (Replication). Based on previous MSFW literature, it was hypothesized that MSFW stress, social support, calling home, and religiosity would be associated with health outcomes. Specifically, it was believed that MSFW stress would be positively related to depressive symptoms, anxiety, *nervios*, self-rated health status, and adverse biomedical health outcomes (i.e., increased blood pressure and glucose levels, and decreased Hemoglobin levels) such that increases in stress would be related to increases in negative health outcomes. It was also hypothesized that asset variables including social support, calling home, and religiosity would be negatively related to depressive symptoms, anxiety, *nervios*, self-rated health status, and biomedical health outcomes, whereby increases in hypothesized asset variables would be related to decreases in negative health outcomes.

Hypothesis 2: Additional Asset Predictors of Health Outcomes. In addition to psychosocial variables that have been identified as assets previously in the MSFW literature, the current study aims to *integrate* general population and MSFW literature to examine other potential asset variables. In accordance with extant literature, it was believed that PWB and accurate expectations would be negatively related to MSFW health outcomes, such that as integrated asset variables increase, negative health outcomes decrease.

Hypothesis 3: Protective Factors that Moderate the Relationship between Stress and Health Outcomes. As hypothesized above, several psychosocial factors including social support, calling home, and religiosity as well as PWB and accurate farm worker expectations have been found to act as asset variables; mitigating negative health outcomes regardless of

adversity or risk level. Given the findings from MSFW and general population literature, it was believed that these variables would also act as protective factors, moderating the relationship between MSFW stress and negative health outcomes. Specifically, it was hypothesized that social support, calling home, religiosity, PWB, and accurate farm worker expectations would moderate the stress-health relationship, whereby individuals with high MSFW stress and high levels of psychosocial support (i.e., social support, calling home, religiosity, PWB, and accurate expectations) would have significantly better health outcomes than individuals with high MSFW stress and low levels of psychosocial support.

Methods

Setting

Data collection was conducted in Moultrie, Georgia. Moultrie is located in Southwest, rural Georgia and is in the center of Colquitt County. Out of Georgia's 159 counties, Colquitt County has ranked first in total agricultural production value for the past 4 years; bringing in over \$443 million in 2009 (University of Georgia, 2009). According to the most up to date 2009 Farm Gate Value Report, Colquitt County led the state in vegetable production (\$129.6 million), and came second in cotton production (\$42.1 million), fifth in broiler production (\$374.9 million), and eleventh in peanut (\$12.1 million) and tobacco production (\$2.1 million). Given that the county has traditionally been a state leader in agricultural production, the amount of farm workers needed to sustain this industry is substantial.

Although it is difficult to count migrant and seasonal farm workers and their families, conservative estimates place the number at more than 100,000 in Georgia. Based on the 2008 Georgia Migrant and Seasonal Farm Worker Enumeration Profiles Study (GA-MSFW EPS), it is

estimated that 59,614 migrant farm workers and their families and 57, 505 seasonal farm workers and their families lived in the state during some part of the year. Specific to this study, the GA-MSFW EPS estimated that approximately 7,549 farm workers (3,843 migrant farm workers and 3,707 seasonal farm workers) resided in Colquitt County at some point in 2008, with the highest numbers present in the summer months of June and July (Larson, 2008).

In Colquitt County, migrant health care services are primarily provided through the Ellenton Migrant Health Clinic, a small federally funded clinic who is the sole provider of primary health care services for MSFWs and their families for four Georgia counties. Given the large influx of farm workers needing medical services during the peak harvest seasons in June and July, the Ellenton Migrant Health Clinic has partnered with the Farm Worker Family Health Program (FWFHP) since 1993 to provide additional medical support, services, and outreach to the area's MSFWs. Specifically, the FWFHP is a two-week intensive biomedical and psychological health service collaborative among several universities and colleges in the state of Georgia (Georgia State University, Emory University, Valdosta State University, and University of Georgia among others) and the Ellenton Migrant Health Clinic. As part of the FWFHP, students and faculty supervisors spend one or two weeks each summer providing physical health examinations and screenings, physical therapy, dental care, psychological crisis intervention and assessment, and educational presentations to approximately 500 adult migrant individuals, the majority of whom are male. Given that MSFWs typically work from sun rise to sun set, the FWFHP offers evening clinics typically at the workplace or housing areas of the workers.

In the current study, data collection was conducted in collaboration with both the Ellenton Migrant Health Clinic and the FWFHP. For a detailed description of the FWFHP please refer to Connor, Layne & Thomisee (2010).

Participants

The sample included 120 Latino male farm workers employed at seven different work sites located throughout Colquitt County. The target population for the current study was both migrant ($n = 99$) and seasonal farm workers ($n = 18$). In order to optimize the limited time that many farm workers spend in Georgia and the limited funding available for this study, a non-probability convenience sample was used. Inclusion criteria included: men, age 18 years or older whose principle employment was farm work. Participants needed to be participating in the FWFHP and residing in Colquitt County.

The current sample was comprised of predominately younger ($M = 31$ years, $SD = 9.62$), Latino men (Table 1). With the exception of one participant who was born in the United States, the sample consisted of foreign born individuals. The majority of participants were from Mexico (92.5%), with a few from Guatemala (3.3%), and El Salvador (3.3%). Most participants (85%) endorsed Spanish as their first language, with the remaining participants preferring indigenous languages such as Nahuatl, Zapoteco, Tojolab'al, Otomí, or Mayan Dialects.

The median education level in the sample was 6th grade, with approximately 18% completing the 12th grade and 5% completing some college. Sixty five percent of participants reported being married or living as married and 68% had 1 or more children. Although over half of the sample of the men reported being married or living as married, only 6.7% had partners in the U.S and only 5.8% had a child in the U.S. Common among migrant farm workers living in the Eastern regions of the U.S. (Gentry et al., 2007), most men (75.8%) reported living in dormitory styled barracks located adjacent to fields in which they worked.

With regard to employment, the majority of the sample (77.5%) had been engaged in farm work for less than 7 years and 15% of those participants reported working in agriculture

less than 1 year. The majority of participants (87.5%) harvested vegetables (most commonly cucumbers, squash, cabbage, melon, and peppers), with the remaining participants working as packers, drivers, and crew bosses.

As shown in Table 2, with several exceptions, the current sample of MSFWs is relatively different in comparison to the national demographic characteristics profile of hired farm workers (U.S. DOL, 2005). Compared to national estimates, the current sample was younger (31 years vs. 33 years), and a larger percent was born in Mexico (92% vs. 75%), came to the U.S. unaccompanied by a spouse or child (90% vs. 57%), and identified as indigenous (14% vs. 5%).

Measures

Measure Adaptation. Given the unique demographic profile of MSFWs (e.g., generally Spanish speaking and lower levels of formal education and functional literacy), designing valid and reliable measures for use among this population can be challenging (Mines, Mullenax, & Saca, 2001). Several recommendations have been offered in the MSFW literature thus far.

Grzywacz et al., (2009), conducted cognitive testing with a sample of 40 MSFWs located in Texas and Florida. Cognitive testing is a technique used by researchers to understand how participants think about and respond to instrument questions. Findings from the study indicated that survey items should be short and direct. When items were long, participants often reported that it sounded as if there was more than one question being asked and frequently requested the item to be re-read for clarification. Findings also highlight the need for creating questions that use the common vernacular of the population. Participants in this study frequently reported that some of the translated measures used higher “class” language and did not resemble the language used in regular conversations among farm workers. On several occasions, the cultural connotations associated with word selection came across as inappropriate and even pejorative in

Table 1

Personal Characteristics of MSFW Study Participants, Southwest GA, 2010 (N = 120)

Personal Characteristics	<i>M (SD)</i>	<i>n</i>	%
Farm Worker Type ^a			
Migrant		99	82.5
Seasonal		18	15
Age Group	31 years (9.62)		
(Range = 18 to 60 years)			
Less than 25 years		35	29.2
25-34 years		49	40.8
35 years and older		36	30
Country of origin			
Mexico		111	92.5
Guatemala		4	3.3
El Salvador		4	3.3
United States		1	0.8
Language			
Spanish		102	85
English		1	0.8
Other		17	14.2
Education	7.43 years (3.67)		
(Median = 6 years)			
(Range = 0 to 15 years)			
Primary: 0 to 8 years		72	60
Secondary: 9-12 years		42	35
Above Secondary		6	5
Marital status			
Married or living as married		78	65
Not currently married		42	35
Number of Children	1.82 (1.79)		
(Range = 0 to 7 children)			
None		38	31.7
1		23	19.2
2		21	17.5
3		18	15
4 or more		20	16.7
Housing ^a			
Dormitory/Barracks		91	75.8
Trailer		18	15
House		8	6.7
Other		2	1.7
Years worked in agriculture	4.3 years (3.91)		
(Range = 1 month to 20 years)			
Less than 1		18	15
1-3		48	40
4-6		27	22.5
7 or more		27	22.5
Work Task ^a			
Harvesting		105	87.5
Packing		2	1.7
Driving		6	5
Crew boss		1	0.8

^a Variables with Missing Data

Table 2

Comparative Summary of MSFWs Demographic Characteristics

	Current Sample (N = 120)	National Sample (N = 6,472)
Demographic Characteristics		
Mean Age*	31 years	33 years
Median education level	6 th grade	6 th grade
% Born in Mexico**	92%	75%
% Spanish speaking	85%	81%
% Married	55%	58%
% Come unaccompanied**	90%	57%
% Identifying as Indigenous**	14%	5%

Note. Significant group difference at * $p < .05$, ** $p < .001$

one case (e.g. one item included the word “*inútil*” to capture feeling uselessness; however, participants reported that this word is used to insult someone who is lazy). Finally, researchers found that some measures were irrelevant and had the potential for measurement error given the unique context of MSFWs lives and daily demands. For example, survey questions assessing the functional impact of depression as number of work days missed may be inappropriate as MSFWs often work regardless of health status to avoid pay loss. Researchers conclude by cautioning against using simple, direct translations of surveys that are created for use with the general U.S. population. Instead, researchers highlight the need for selecting measures designed for specific use in MSFW population. When this option is not available, adaptation is recommended to ensure that the meaning and content of the translated items are culturally relevant and applicable to MSFWs.

Additionally, Baer (1996) conducted a similar study with MSFWs located in Florida and found that participants’ interpretation of the formal choice categories (e.g., “most of the time:” “some of the time,” “a little of the time,” and “none of the time”) varied greatly. She suggested

that when possible, response categories should be given in terms of number of days instead of vague quantifiers.

In accordance with these findings, measures used in the current study have been carefully selected and adapted for specific use with MSFWs (see Appendix A for full survey). Adaptations included: 1) making complex items shorter and more direct, 2) rewording items and using colloquial terms common to Latino MSFWs, 3) removing items that were irrelevant to the intended target sample, and 4) revising response categories to be as explicit as possible.

Similarly, where available, researchers utilized measures that have been designed for specific use with the MSFW population (i.e., stress scale) and/or previously used in MSFW psychological health research (i.e., CES-D, PAI, social-support, and religious coping).

Overview of Measures. PWB is a new construct that, to our knowledge, has not yet been used with MFSWs; thus, this study is the first to measure this concept in this population. The MSFW Stress Scale was adapted for the current study, based on findings from Magaña & Hovey (2003) and Snipes et al., (2007). The remaining measures used in this study have been found in prior research to be reliable and valid for use with Latino immigrants and/or with MSFWs. Existing validated Spanish language versions of the depression, anxiety, *nervios*, religiosity, and stress scales were used. All other scales and items included in the survey (i.e., social support, psychological well-being, and demographic and descriptive information) as well as the consent form, were translated into Spanish (Mexican) through the double translation procedure (Brislin, 1980), with the help of two bilingual individuals.

Of note, scales and survey items were not only carefully selected based on previous reliability and validity estimates, but consideration was also given to the total number of questions asked and the estimated amount of time it would take to complete the survey and

consent. This consideration was important to the researchers given that data collection occurred during the peak of the harvesting season in which the men had typically just come off of working a 12+ hour day in the fields. Therefore, to respect participants' time and energy, short-form versions of scales as well as scales with fewer items were used when possible.

Dependent Variables

Biomedical Health. Indicators of biomedical health were derived from the physical health screening and biomarker data collection provided through the FWFHP. The specific markers selected for inclusion have well established associations with chronic illness and include: systolic and diastolic blood pressure, hemoglobin level, and glucose level.

Systolic and diastolic blood pressures are markers of hypertension, a well-known risk factor for heart disease, stroke, and kidney disease. Blood pressure (B/P) was measured via the readings from a mercury sphygmomanometer with the respondent in a seated position. Normal B/P values range from 90-120 mmHg for systolic and 60-80 mmHg for diastolic (US Department of Health and Human Services). According to the norms used by the FWFHP, an individual was considered to be at risk for hypertension if B/P was at or above 135 mmHg systolic or 85 mmHg diastolic.

Hemoglobin (Hgb) is a protein found in red blood cells that carries oxygen throughout the body. Abnormal levels of Hgb have been found to be related to anemia, congenital heart disease, and dehydration. Hgb was measured with an automated machine designed to detect Hgb levels from a blood sample. According to the norms used by the FWFHP, normal values of Hgb in males range from 14 to 18 g/dl. According to the World Health Organization criteria (2001), low Hgb values (<14) indicate the presence of anemia and may be the result of malnutrition,

cirrhosis of the liver, and/or kidney failure. High levels of Hgb (> 18) may be related to congenital heart disease and/or dehydration (Zuckerman, 2001).

A human's blood glucose level is tightly regulated by the metabolic system and indicates the amount of glucose (sugar) present in the blood stream at a given time. Abnormal glucose levels (i.e., levels above or below normal values) may be an indicator of a diabetic condition, which is itself a risk factor for a variety of illnesses including heart disease, stroke, and memory deficits. A blood glucose test was used to measure the amount of glucose present in the blood stream. According to the norms used by the FWFHP, normal glucose levels fall between 70 and 115 mg. Glucose levels < 70 are indicative of hypoglycemia and glucose levels > 115 are indicative of hyperglycemia.

Results of the health screen, including B/P, Hgb, and glucose biomarkers, were recorded on the FWFHP Adult Clinical Checklist (see Appendix B). Participants' were given a score of "1" if their result on a specific biomarker fell in the "abnormal" range (i.e., B/P systolic: ≥ 135 mmHg; B/P diastolic: ≥ 85 mmHg; Hgb: < 14 and/or > 18 ; Glucose: < 70 mg and/or > 115 mg) and given a score of "0" if their results fell in the "normal" range.

Depressive Symptoms. Depressive symptoms were measured with the Boston x 4 (Kohout, Berkman, Evans, & Cornoni-Huntley, 1993), a 10-item short form of the Center for Epidemiological Studies-Depression scale (CES-D; Radloff, 1977). The Boston x 4 includes items assessing depressive symptoms in the three primary domains of symptomatology identified in the parent instrument (i.e., depressed affect, positive affect, and interpersonal relations) and is comprised of primarily concrete experiences, such as "I felt depressed," "I was happy," and "People were unfriendly." A previous study using Mexican immigrant samples found that the Boston x 4 accounted for 89.5% of the variance in scores from the full CES-D (Grzywacz et. al.,

2006a). The Boston x 4 assesses frequency of depressive symptoms within the previous week using the four-point response set of the original CES-D. Response options include 0 (“less than 1 day”), 1 (“1–2 days”), 2 (“3–4 days”), and 3 (“5–7 days”). A total depressive symptoms score was calculated by summing responses to all 10 items and ranged from 0 to 30. It is suggested that individuals scoring higher than 10 are at risk of experiencing clinically significant depressive symptoms (Grzywacz et. al., 2006a).

The full 20-item version of the CES-D (Radloff, 1977) is one of the most widely used measures of psychological distress in community samples. It has demonstrated adequate internal consistency ($\alpha = 0.80-0.90$) and construct validity among Mexican-American samples (Golding & Aneshensel, 1989; Golding, Aneshensel & Hough, 1991) and MSFW samples (Alderete et. al., 1999; Hovey & Magaña, 2000, 2002b; Magaña & Hovey, 2003; Grzywacz et. al., 2006b; Hiott et. al., 2008). Additionally, the Boston x 4 scale has been found reliable ($\alpha = .79$ [95% CI = 0.76 0.81]) and valid for use with Latino immigrants as well as with MSFWs (Grzywacz et. al., 2006a; Grzywacz et. al., 2009). The Cronbach Alpha reliability estimate for the Boston x 4 in the current study was .73.

Anxiety. Anxiety was measured with the Anxiety scale of the Personality Assessment Inventory (PAI; Morey, 1991). This 24-item scale measures clinical features of anxiety symptomatology across 3 domains: cognitive (e.g., “I often have trouble concentrating because I’m nervous”), affective (e.g., “Sometimes I am afraid for no reason”), and physiological (e.g., “I often feel jittery”). The original PAI asks individuals to rate how accurate each statement is about themselves on a four-point scale ranging from 1 (“false, not true at all”) to 4 (“very true”). For the current study, PAI response categories were revised to be more explicit. After each statement was read out loud, participants were asked whether the statement was true about them.

If it was not true, a score of “0” was given for the item. If the item was positively endorsed, participants were then asked to rate the degree to which the item was true for them on a 1 (“A little”) to 4 (“A lot”) scale. A visual depiction of the scale was given to anchor responses (see Appendix A). A total anxiety symptoms score was calculated by summing responses to all 24 items. Total scores range from 0 to 72, whereby higher scores indicated higher levels of anxiety.

The PAI anxiety scale has been found to have adequate internal consistency reliability ($\alpha = 0.80\text{--}0.91$), test–retest reliability ($r = 0.85\text{--}0.88$), and construct validity among general, Mexican-American, and MSFW samples (Morey, 1991; Rogers, Flores, Ustad, & Sewell, 1995; Fantoni-Salvador & Rogers, 1999; Hovey & Magaña, 2000, 2002abc; Magaña & Hovey, 2003; Grzywacz et al., 2006b; Hiott et al., 2008). The Cronbach Alpha reliability estimate for the measure in the current study was .91.

Nervios. The prevalence and severity of *nervios* was assessed by self-report: “Have you suffered from *nervios*/nerves in the past month?” (*En el mes pasado usted ha padecido de nervios?*). Previous researchers have used this question as a way to assess for the prevalence of *nervios* (Salgado de Snyder et al., 2000; Weigel et al., 2007; Weller et al., 2008). Participants who had not experienced *nervios* in the last month were given a score of 0. Participants who endorsed experiencing *nervios* were asked to rate the severity of symptoms experienced on a 1 (“A little”) to 4 (“A lot”) scale, whereby higher scores indicate greater severity of *nervios* symptoms.

Self-Rated Physical Health. Perceived overall physical health was assessed with the following question: “In general, how would you rate your overall physical health?” Responses were given on a five-point ordinal scale ranging from 1 (“very poor”) to 5 (“excellent”). A visual depiction of the scale was given to anchor responses (see Appendix A). Previous research has

found this question (and similar variations in phrasing of this question) to be a predictor of morbidity, mortality, and health care utilization (Goldman, Gleib, & Chang, 2004).

Risk Variable

MSFW Stress. MSFW stress was measured with a 16-itemed, adapted version of the Mexican Farmworker Stress Scale (MFSS) developed by Snipes et al. (2007). The MFSS is a 23-item instrument created specifically for use with the Mexican immigrant farm worker population. The scale assesses MSFW stress occurring in the last month in the areas of work, family, and community. Items are rated on a 5 point scale from 1 (“Not at all”) to 5 (“Yes, most of the time”). The MFSS has demonstrated adequate internal consistency ($\alpha=0.91$), test-retest reliability ($r=.84$), and construct validity in an independent sample of Mexican immigrant farm workers.

The MFSS was developed through focus groups with both male and female migrant farm workers and the themes generated from the interviews were then used to create the 23-item instrument that reflects the perceived stress of both genders. Accordingly, six items were removed from the original MFSS for this study due to their lack of relevance for the current sample of male farm workers (i.e., items related to stress about child care, discrimination in schools, communication with youth in the community, problems with children, communication in the home, and domestic violence). Additionally, two items related to stress from drugs and alcohol use in the home were removed as previous research has shown that alcohol and drug use are typically used in this population to cope with stress versus cause stress (Worby & Organista, 2007). Finally, for the sake of the present study, three items related to stress resulting from depressive symptoms were removed so they would not confound with the current hypothesis (i.e., stress predicting depressive symptoms). Included in the remaining 12 items, are 9 out of the

10 questions that prompted responses indicating moderate levels of stress or higher in Snipes et al., (2007) study.

In addition to removing items to increase relevancy for the current sample, 4 items were added from the Migrant Farm Worker Stress Inventory (MFWSI; Magaña & Hovey, 2003). The MFWSI is a 39-item instrument based on the top stressors identified from in-depth interviews with MSFWs. The following items from the MFWSI were included in the current scale: “It is difficult to be away from my friends” (#1 identified stressor), “I do not have reliable transportation” (#6 identified stressor), “Sometimes I feel that my housing is inadequate” (#7 identified stressor), and “I worry about being deported” (#11 identified stressor). With the addition of these stressors, the current scale included items that related to the top eight stressors identified by 24% or more of the male participants in Magaña & Hovey’s (2003) study. Furthermore, the current scale included items related to the stressors identified by the men in the research conducted by Mysyk et al. (2008) (i.e.. relocation, homesickness, communication barriers, working conditions, work relations), as well as the stressors identified by Lackey (2008) as causes of depression (i.e. separation from loved ones, discrimination and harassment, long hours and multiple jobs, not having a job or receiving bad pay, social isolation).

In addition to adapting the scale items, response categories of the original MFSS were revised to assess the severity of stress that resulted from each of the stressors, versus the frequency of the stressors’ occurrence. After each statement (e.g., “I do not have enough money to pay my bills”) participants were asked whether the statement was true about them. If it was not true, a score of “0” was given for the item, indicating that no stress was experienced as a result of the stressor. If the item was positively endorsed, participants were then be asked to rate how stressed they had been as a result of the stressor on a 5 point scale from 0 (“Not at all”) to 4

(“A lot”). A total stress score was calculated by summing responses to all 16 items and ranged from 0 to 64. The adapted 16-item version of the MFSS was reviewed by an outreach worker from the Ellenton Migrant Health Clinic for its appropriateness for use in the current sample. The Cronbach Alpha reliability estimate for the measure in the current study was .80.

Asset Variables

Social Support. Degree of social support was derived from participants’ responses to 6-items assessing emotional, instrumental, and quantity of support. Items were based off of questions used in previous studies with MSFWs (Alderete et. al., 1999; Finch & Vega, 2003), and higher scores indicated a higher degree of perceived social support. The Cronbach Alpha reliability estimate for the measure in the current study was .68.

Calling Home. Frequency of contacting home was measured via self-report. Participants were asked “How often do you call a relative in Mexico (or other country of origin)?” and responses ranged from 1 (“about once a year or less”) to 7 (“about everyday”). This question has been used in previous research with Eastern U.S. MSFWs (Grzywacz et al., 2006b).

Religiosity. Religiosity was assessed with the Brief Religious Coping Scale (BRCS). The 2-item BRCS measures perception of religiosity (“How religious are you?”) and influence of religion (“How much influence does religion have upon your life?”) on a 4-point response scale. The possible overall score ranges from 2 (low religious coping) to 8 (high religious coping), whereby higher scores indicate higher religiosity. The BRCS has been used to assess religiously among Mexican immigrants and MSFWs in previous studies (Hovey & Magaña, 2000, 2002abc). The Cronbach Alpha reliability estimate for the measure in the current study was .63.

Positive Well-Being. Positive well-being was assessed with an adapted version of Ryff’s (1989) Positive Well-Being (PWB) scale-short form. The original short-version of PWB scale

consists of 18-items divided across 6 psychological dimensions of eudaimonic well-being: autonomy, personal growth, environmental mastery, positive relations with others, purpose in life, and self-acceptance. Each of the original subscales consisted of three items with a relative balance of positive and negative items, self-administered via the questionnaire. On a scale from 1 to 7 (with 4 as a middle category of neither agree nor disagree), respondents indicate whether they agree or disagree (strongly, moderately, or slightly) with items that describe how they functioned (i.e., thought or felt). The three-item scales have shown modest internal consistency (i.e., around $\alpha = .50$; see Ryff and Keyes 1995), and the internal consistency of the combined 18-items is $\alpha = .81$. For the current study, the original 18-item version was modified in the following ways: 1) items written in English were reworded to be shorter and more direct, 2) translations were made using language more common to Latino MSFWs, 3) the three items comprising the personal growth subscale were removed as the questions did not appear to be particularly relevant for the intended sample, and 4) response categories and question format were revised to be as explicit as possible (i.e., similar to the changes made to the PAI). As the individual subscales from the original 18-item PWB scale have demonstrated modest internal consistency, the current study will only use the combined 15-item score for analyses. The possible overall score ranged from 0 to 45, whereby higher scores indicate higher positive well-being. The Cronbach Alpha reliability estimate for the measure in the current study was .64.

Farm Worker Expectations. Based on the findings from Mines, Mullenax, & Saca (2001), farm worker expectations was assessed with one item (i.e., “Is the work that you do here...”) measured on a 3-point response scale (i.e., “worse than expected” = 1, “what you expected” = 2, “better than you expected” = 3).

Subsequent to data collection, farm worker expectations was recoded from a 3-level categorical variable to a dichotomous variable in order to reduce the number of variables entered into each regression equation. Based on the findings from Mines, Mullenax, & Saca (2001) and Vega, Kolody, and Valle (1987), farm worker expectations was recoded so that participants indicating that the work that they did was worse than expected ($n = 32$) were given a score of 0 and participants who reported that the work they did was what they expected or better ($n = 86$) were given a score of 1.

Demographic and Descriptive Information. Additionally, the following demographic and descriptive information was collected: name and date of birth (to match participants to their biomedical data), educational level, marital status, number of children, preferred language use, place of birth, migrant vs. seasonal employment status, type of home, who lives in the home, type of crop picked, number of years worked as a farmer, and length of time away from family.

Additional health information was collected and recorded during the health screen including prescribed medication use.

Procedure

Recruitment and Informed Consent. Participants were recruited through the FWHFP. In order to maximize the number of MSFWs seen through the FWHFP, healthcare services were provided outdoors, at the end of the workday, and in the MSFWs' place of work and/or housing area. Thus, in the evening camps, as farm workers were waiting to receive healthcare services, the lead PI, Dr. Julia Perilla, made a general announcement to the group informing them of the study and invited interested individuals to participate in a brief survey. The announcement was made in Spanish and clearly indicated the purpose and procedures of the study, how long it would take to complete, compensation, and confidentiality procedures. It was also made clear

that the farm workers' decision to participate in the study was voluntary and would in no way impact their access to health care services or any other resource to which they were entitled. For those interested in participating, an informed consent was read out loud to each individual in Spanish as literacy level was not assumed. At the end of the consent process, individuals were given 3 options including: 1) participating in the survey part of the study and allowing researchers access as specified by The Health Insurance Portability and Accountability Act (HIPAA) to their biomedical health data that was collected by the FWFHP, 2) participating in the survey, but not giving permission for the use of their bio medical health data, or 3) not participating in the research study. The respondents were given information sheets in Spanish containing the same information that was reviewed orally, and any questions about the study were answered at this time.

Out of the 120 participants who were recruited and agreed to participate in the current study, approximately 94% ($n=113$) gave full consent for both completing survey items and allowing access to their biomedical health data. Mean comparisons revealed that the remaining seven participants who gave partial consent (i.e., consent for participation in survey part of the study, but no consent to access health data) did not appear to differ significantly from those who gave full consent on any variables of interest including depression and anxiety score, stress level, social support, frequency of calling home, religiosity, PWB, farm worker expectations, age, and demographic information.

Data Collection. Health information and biomedical markers were collected by the FWFHP nursing students during an initial health screen. At the end of the evening clinics, all medical records were taken to the Ellenton Migrant Health Clinic by FWFHP medical staff and entered into their database for storage.

Psychological survey data were collected by a total of 8 interviewers. Surveys were administered via face-to-face and interviews were conducted primarily in Spanish. All interviewers were fluent Spanish speakers and participated in training sessions provided by the lead PI that included training in HIPAA compliance, informed consent, confidentiality, questionnaire administration and procedures, and cultural competency. Each survey question was read out loud by the interviewers and participants were given visual stimulus cards to help anchor their responses. The survey was administered one time and took approximately 30 minutes to complete.

Interviews were conducted at the site of the FWFHP clinics each week night (Monday through Thursday) during two consecutive weeks in June. During the first week of data collection, one of the evening camps was cancelled due to weather conditions. Thus data were collected across 7 days at 7 different work sites.

In order to ensure the participants' privacy, interview information was collected in a secluded area, away from the central place where health services were being provided. All interviews were conducted within eyesight (not earshot) of the lead PI and the MSFW providers. These safeguards helped to ensure the privacy of participants while maintaining the safety of interviewers.

At the completion of the survey, participants were thanked for their time and given a small monetary gift as suggested by Marín and Marín (1991). As sensitive information regarding depression, anxiety, and stress were collected, brief crisis counseling provided through the FWFHP was available to all participants throughout the duration of the study. Additional referrals were coordinated with the Migrant outreach worker for those individuals who needed services after the completion of the study.

The participants' direct involvement in the study ended at the completion of the survey. Secondary data collection occurred the following day at the Ellenton Migrant Health Clinic. The student PI matched survey data to corresponding medical data that was collected by the FWFHP medical providers the previous evening. Participant names were collected during the face-to-face interview for the purpose of matching the survey responses with the corresponding biomedical health data. Once these data were matched, the names and date of birth were deleted (via paper shredder) and numeric codes (e.g., #001) were assigned to each protocol. No record was kept tracing the protocol number to any identifying information. While in Moultrie, data were stored in a locked storage box that was kept by the PI or student PI at all times. Once back in Atlanta all data were stored in a locked cabinet in the PI's lab. All data were entered into a password protected database. Notably, the database contains no identifying information (e.g. name, date of birth). It is believed that these safeguards further ensure participants' privacy.

Results

Data Analysis Plan

The aim of the current study is two-fold. First, given the dearth of research on the mental and physical health of MSFWs population in Georgia, one of the initial goals of this study was to provide information about the psychosocial and biomedical functioning of this sample. Descriptive statistics and correlations were run to get a better understanding of the sample and its functioning and independent-samples *t*-tests and ANOVAs were conducted to examine group differences and similarities.

Utilizing a resilience framework, the second aim of this study was to *replicate, integrate, and build upon* the literature to identify potential risk, asset, and protective factors that are

associated with health outcomes. It was hypothesized that the risk factor MSFW stress would be positively related to adverse health outcomes and that the asset variables, social support, calling home, and religiosity, would be negatively related to adverse health outcomes (*Hypothesis 1*). Integrating previous general population and MSFW literature, it was also hypothesized that the asset variables, PWB and farm worker expectations, would be negatively related to adverse health outcomes (*Hypothesis 2*). Finally, given the gap in MSFW on interaction effects, the current study sought to build upon extant literature. It was hypothesized that social support, calling home, religiosity, PWB, and accurate expectations would act as protective factors, moderating the relationship between MSFW stress and health outcomes (*Hypothesis 3*).

A variable-focused (versus person-focused) approach to studying resilience in this population was used given that the aim of the study was to test for linkages among predictor and outcome variables. In order to examine the study's hypotheses, three sets of hierarchical regressions were conducted for each dependent variable. To test *Hypothesis 1* and 2, each dependent variable (i.e., depressive symptoms, anxiety, and biomedical health) was separately regressed on hypothesized and integrated risk (i.e., stress) and asset (i.e., social support, calling home, religiosity, PWB, and farm worker expectations) predictors. In this model, all asset variable main effects were considered together to identify whether they were associated with negative health outcomes in the direction predicted.

Next, *Hypothesis 3* was tested by examining change in the R^2 model fit after the inclusion of interaction terms. In order to maximize degrees of freedom and minimize collinearity, the *hypothesized* protective interactions (stress by social support, stress by calling home, and stress by religiosity), and *integrated* protective interaction terms (stress by PWB and stress by farm worker expectations) were included into the model in separate blocks. Thus, risk and all asset

main effects were entered in the first step, and then hypothesized interaction terms were entered into the second step of the regression equation. Subsequent analyses were then conducted whereby the block of hypothesized interactions were replaced with the integrated interaction terms.

Preliminary Analyses

Data were first screened for missingness and outliers. As shown in Table 3, there was a minimal amount of missing data across the variables (0% - 16%). Given the nature of the method of biomedical data collection, especially with the required blood draw for Hgb and glucose level biomarkers, relatively more biomedical data were missing compared to data collected via the survey. Missing data were handled using expected maximization algorithm (EM), a maximum likelihood missing variable procedure. This procedure was conducted at the scale level using SPSS Missing Variables Analysis and has been validated as a preferred means of handling missing data (Howell, 2007; Raghunathan, 2004; Widaman, 2006). The imputed values represent the most likely value that would have been observed for a particular case given the data profile on measured variables. The percentage of individuals whose scale score was imputed using EM is shown in Table 3. Little's MCAR test was conducted in SPSS to establish the missingness of the values. The MCAR test findings were not significant, which is consistent with data that are missing completely at random, $\chi^2(291) = 278.67, p = .69$.

Once imputation was completed, data were examined for outliers. Scatter plots of the continuous variables revealed that outliers were not sufficiently different from other data points to warrant data transformation. Next, variables were inspected for normality. With the exception of the dependent variables *nervios*, self-rated physical health, and the biomedical markers, all

Table 3

Summary of Missing Data at Scale Level for Continuous Variables of Interest (N=120)

	<i>n</i>	% of Data Imputed
Dependent Variables		
Depressive symptoms	110	8.3
Anxiety symptoms	110	8.3
<i>Nervios</i>	119	0.8
Self-rated physical health	120	0
Blood pressure ^a	105	7
Hemoglobin ^a	98	13.3
Glucose level ^a	95	15.9
Risk Variable		
MSFW stress	113	5.8
Asset Variables		
Social Support	117	2.5
Religiosity	119	0.8
Positive Well-Being	114	5

^a *N* = 113. For biomarkers, 7 participants did not give consent for accessing health records.

variables had adequately normal distributions in that skew and kurtosis fell within acceptable ranges (Tabachnick & Fidell, 2007; Field, 2005). *Nervios*, a one-item measure, was positively skewed such that most of the sample ($n = 94$) denied experiencing *nervios* during the previous month. Data transformation techniques including a square root, log10, and negative inverse transformation were attempted but did not significantly improve the normality of the distribution.

Given the large number of participants in this sample that did not endorse experiencing *nervios*, this measure was removed as a dependent variable from the regression analyses. However, it was further explored in the descriptive section of the analyses.

Similar to *nervios*, self-rated physical health was a one-item measure that did not conform to the assumptions of normality, and the distribution was not aided by data transformation techniques. Most of the sample (89.2%) reported having “good” to “excellent” health with only 13 participants indicating that their health was “very bad” or “poor.” Given that

the distribution was negatively skewed and that the primary aim of the study was to examine biomedical versus self-rated health, this measure was also removed as a dependent variable from the regression analyses. However, self-rated health was also furthered explored under the descriptive section of the analyses.

Finally, the distributions of the four different biomedical markers did not meet criteria for normality. Attempts at transformation were unsuccessful and thus each biomedical marker was dichotomized based on the norms provided by the FWFHP. Participants' were given a score of "1" if their result on a specific biomarker fell in the "abnormal" range (i.e., B/P: ≥ 135 mmHg systolic or 85 mmHg diastolic; Hgb: < 14 and/or > 18 ; Glucose: < 70 mg and/or > 115 mg) and given a score of "0" if their results fell in the "normal" range. A total biomedical index score was then created by summing the dichotomous results of all four biomarkers and scores ranged from 0 to 4. Diagnostics assessing for normal distribution were conducted again on the new biomedical index dependent variable. The distribution of the index variable remained positively skewed such that a large portion of the sample had risk scores of 0. Given that the residuals of the index score were not normally distributed and exhibited heteroskedasticity, OLS regressions would produce incorrect significance levels (i.e., smaller SEs). To circumvent this problem and obtain correct estimates of statistical significance, Poisson regression was used. Poisson regression is a maximum likelihood method that is appropriate for count data (i.e., the biomedical index score represents a "count" of the number of health risk factors a participant possesses), and assumes the mean of the distribution is equal to the variance (Cohen, Cohen, West, & Aiken, 2003). Since the biomedical index mean ($M = 1.18$) and variance ($SD^2 = .99$) were relatively equal, Poisson regression was used to examine linkages amongst predictor variables, moderators, and biomedical health.

Correlations among all continuous and dichotomous primary measures, demographic characteristics, and descriptive information were examined to identify potential covariates to include in the regression models (see Table 4). Age and medication use were significantly correlated with the biomedical index score ($r = .30, p < .01$; $r = .38, p < .01$) and were thus included as covariates in regression models in which biomedical health was the dependent variable.

A series of t-tests (see Table 5) and ANOVAs (see Table 6) were conducted to assess differences amongst categorical study variables. Analyses revealed no significant difference between the type of farm worker, preferred language, type of housing, and camp sites on any of the dependent study variables. Thus, no categorical descriptive variables were included as covariates in the regression models.

Next, in order to reduce the possibility of multicollinearity and to make the slopes more interpretable when the level of the moderator was average, continuous independent variables were centered, whereby the computed mean of each variable was subtracted from each case's score. Subsequently, interaction terms were then created by multiplying the centered variables together.

Finally, regression diagnostics were conducted to determine whether the linear regression models (i.e., model for depressive symptoms and anxiety), violated any of the regression assumptions. Normal distribution of error, uncorrelated IV and error terms, homoscedasticity, and specification error were all assessed. Once variables were mean centered, higher tolerance suggested that multicollinearity was low. Since all the assumptions were met, the regression coefficients were determined best linear unbiased estimates in that they provided accurate inferences about the population parameters.

Table 4

Correlation Matrix of Study Variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. Biomedical Health Index ^a	1.00															
2. Depressive symptoms	-.03	1.00														
3. Anxiety	.04	.52**	1.00													
4. Stress	-.05	.41**	.66**	1.00												
5. Social Support	.03	-.15	.05	.04	1.00											
6. Call Home ^a	.14	.25**	.06	-.02	-.04	1.00										
7. Religiosity	-.01	-.05	.06	.17	.05	.06	1.00									
8. PWB	.06	-.30**	-.33**	-.22*	.03	.13	.03	1.00								
9. Farm Worker Expectations	-.03	-.28**	-.34**	-.35**	-.02	.03	-.08	.07	1.00							
10. Age	.19*	.02	-.07	-.11	-.19*	.16	.08	.08	-.05	1.00						
11. Education level	.05	-.03	-.12	-.02	.05	.15	-.09	.18	.11	-.24**	1.00					
12. Marital status	.09	.08	.06	.14	.02	.28**	.13	-.06	-.13	.42**	-.11	1.00				
13. # of children	.06	.10	.00	-.01	-.19*	.18	.12	.00	.04	.69**	-.35**	.52**	1.00			
14. # of years worked as MSFW	-.04	-.11	-.08	-.09	.21*	.11	-.11	-.06	.04	.23*	-.19*	.17	.12	1.00		
15. Time away from family ^a	-.07	-.17	.04	.01	-.05	-.22*	.11	.08	.11	.06	-.29**	-.16	-.09	.20*	1.00	
16. Medication use	.31**	.10	-.06	-.09	-.05	.10	-.26**	.08	.02	.36**	-.06	.03	.22*	-.07	-.09	1.00

Note. * $p < .05$ and ** $p < .01$.

^a Spearman rank correlation versus Pearson correlation.

Table 5

Differences in Depressive Symptoms, Anxiety, and Biomedical Health amongst Dichotomous Study Variables

Variable	Type of Farm Worker		<i>t</i> -test	Preferred Language		<i>t</i> -test	Housing		<i>t</i> -test
	Migrant	Seasonal		Spanish	Indigenous		Barracks	Other	
	(<i>n</i> =99)	(<i>n</i> =18)		(<i>n</i> =102)	(<i>n</i> =18)		(<i>n</i> =91)	(<i>n</i> =29)	
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)		<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)		<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	
Biomedical Health Index	1.23 (1.00)	.78 (.88)	<i>t</i> (108) = 1.79	1.20 (1.01)	1.00 (.89)	<i>t</i> (110) = .74	1.16 (1.04)	1.23 (.82)	<i>t</i> (111) = -.31
Depressive Symptoms	9.40 (5.61)	8.90 (6.16)	<i>t</i> (115) = .36	9.42 (5.94)	9.40 (4.43)	<i>t</i> (117) = .03	9.91 (5.86)	7.77 (4.95)	<i>t</i> (118) = 1.77
Anxiety	26.40 (17.60)	27.50 (21.60)	<i>t</i> (115) = -.23	26.78 (18.48)	29.17 (17.00)	<i>t</i> (117) = -.50	25.73 (17.87)	30.74 (19.21)	<i>t</i> (118) = -1.29

Note. There are no significant differences between groups at $p < .05$.

Table 6

Differences in Depressive Symptoms, Anxiety, and Biomedical Health between Camp Sites

Variable	Camp Site							ANOVA
	1	2	3	4	5	6	7	
	(<i>n</i> =6)	(<i>n</i> =27)	(<i>n</i> =6)	(<i>n</i> =18)	(<i>n</i> =37)	(<i>n</i> =11)	(<i>n</i> =15)	
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	
Biomedical Health Index	1.00 (1.23)	1.12 (.97)	1.17 (.75)	1.71 (.92)	1.00 (1.12)	1.22 (1.09)	1.13 (.64)	F (6, 106) = 1.05
Depressive Symptoms	9.67 (4.49)	8.75 (5.58)	8.16 (3.96)	8.63 (5.22)	11.68 (6.21)	7.36 (4.92)	7.94 (5.97)	F (6, 113) = 1.58
Anxiety	25.42 (11.74)	22.99 (15.08)	36.35 (16.78)	29.10 (19.60)	31.07 (20.02)	26.98 (19.69)	18.13 (16.80)	F (6, 113) = 1.45

Note. There are no significant differences between camp sites at $p < .05$

Primary Analyses: Description of the Sample of Georgia MSFWs.

Descriptive statistics were run on the variables included in the current analyses to learn more about the biomedical and psychological profile of the sample (see Table 7). Furthermore, exploratory analyses including correlations, *t*-tests, and ANOVAs were also conducted to examine potential relationships and group differences amongst study variables.

Using correlation analyses, several significant relationships were found between asset variables and demographic characteristics. Calling home was found to be significantly correlated with marital status and time away from family, such that calling home increased when participants identified as married or partnered and calling home decreased as time spent away from family increased (see Table 4). In addition to calling home, social support was found to be significantly correlated with participants' age, number of children, and number of years worked as a MSFW (see Table 4). A negative relationship was found between social support and age and number of children, whereby as age and the number of children increased, social support decreased. A positive relationship was found between social support and years spent as a MSFW, whereby as the number of years increased, social support also increased.

Independent sample *t*-tests and ANOVAs were then conducted to identify any group differences between demographic characteristics on stress and asset variables. Significant differences were found between housing conditions on social support, $t(118) = -2.12, p < .05$, whereby participants living in dormitory/barrack styled housing had significantly less social support ($M = 13.99, SD = 5.58$) compared to participants living in other types of housing (e.g., trailers, houses, and apartments) ($M = 16.52, SD = 5.70$). Similarly, significant differences in MSFW stress levels were found between camp sites, $F(6,113) = 4.15, p < .01$. Post hoc

analyses revealed that both Camp Site 2 ($M = 16.83$, $SD = 7.40$), and 7 ($M = 12.93$, $SD = 5.43$) had significantly lower levels of MSFW stress than Camp Site 5 ($M = 25.07$, $SD = 11.48$).

Table 7

Descriptive Statistics for Variables used in the Primary Analyses

Variable	<i>n</i> or <i>M</i>	% or <i>SD</i>	Min.	Max.
Biomedical Health, <i>n</i> (%)				
Biomedical Index	1.18	.99	0	4
0 Risks	32	28.2%		
1 Risk	42	37.2%		
2 Risks	28	24.8%		
3 Risks	9	8.0%		
4 Risks	2	1.8%		
Psychological Health, <i>M</i> (<i>SD</i>)				
Depressive Symptoms	9.40	5.71	0	26
Anxiety	26.94	18.25	2	73
Risk Variable, <i>M</i> (<i>SD</i>)				
MSFW Stress	19.73	10.64	1	50
Hypothesized Asset Variables, <i>M</i> (<i>SD</i>)				
Social Support	14.60	5.69	2	24
Calling Home	5.19	1.04	1	7
Religiosity	5.71	1.70	2	8
Integrated Asset Variables				
PWB, <i>M</i> (<i>SD</i>)	42.46	8.12	20	60
Farm Worker Expectations, <i>n</i> (%)				
Below expected	32	27.1%		
Expected or better	86	72.9%		
Covariates				
Age, <i>M</i> (<i>SD</i>)	31	9.62	18	60
Medication Use, <i>n</i> (%)				
No	98	96.1%		
Yes	4	3.9%		

Physical Health

Biomedical Health Status. In order to compare the biomedical health of the current sample with national and MSFW specific estimates, biomedical data were recoded according to national norms (see US DHHS (2010) for blood pressure and self-rated health norms; World

Health Organization (2001) for Hgb norms; Villarejo et al., (2010) for glucose norms). As such, participants whose blood pressure was over 140 mmHg systolic *or* 90 mmHg diastolic were given a score of 1. Participants with hemoglobin concentrations lower than 13.5 gm/dl were considered to be below the normal range and were given a score of 1. For U.S. adults, the recommended blood glucose range is 65-115 mg/dl for subjects who have undergone a fast prior to the blood draw. Similar to the participants in the California Agricultural Workers Health Survey, the current sample did not undergo a fasting glucose measurement. Thus, the current study used the cut-offs provided in the CAWHS data in order to compare prevalence rates across samples (Villarejo et al., 2010). As such, participants with a blood glucose level above 200 mg/dl were given a score of 1. Finally, the prevalence for persons with “fair” or “poor” self-rated health has been examined in U.S. population. Thus, self-rated physical health was recoded accordingly.

Table 8 provides the prevalence rates of biomedical risk indicators for adult males in the general U.S. and Hispanic or Latino population, the CAWHS sample, and the current sample. Overall, the participants in the current sample were in relatively good health. Prevalence rates of abnormal blood glucose levels were comparable to those found in CAWHS sample of MSFWs in California and the percentage of individuals with fair or poor self-rated health were comparable to national estimate for the general and Latino U.S. population. Notably, the percentage of MSFWs in the current sample with elevated blood pressure was considerably smaller compared to national and MSFW specific prevalence rates. However, the percentage of individuals in the current sample who had abnormal Hemoglobin levels, an indicator of iron deficiency anemia, were drastically greater than the general and Latino U.S. population as well as the representative sample of MSFWs located in California. Confirmatory analyses for anemia risk (i.e., Hgb < 13.5 mg/dl) were conducted using biomedical data collected in 2008 and 2009 by the FWFHP. Prevalence

rates of abnormal Hgb levels were comparable across all three years (2008: 31.4%, 2009: 31.7%, 2010: 31%).

Table 8

Prevalence Rates of Biomedical and Self-Rated Health Outcomes Across Samples

Health Outcome	Gen. US Population ^a	Hispanic or Latino US Population ^a	CAWHS (N = 416)	Current Sample (N=113)
High blood pressure (>140/90)	31.6*	26.3*	27.2*	9.7
Diabetes risk, (non-fasting blood glucose > 200 mg/dl)	--	--	4.8	5.3
Anemia risk (hemoglobin <13.5 mg/dl)	2.9* ^b	1.7* ^b	4.8*	31.0
Percent of persons with fair or poor health	9.1	13.3 ^c	--	10.8

* $p < .001$ Indicates significant difference with current sample.

^a Estimates are age-adjusted

^b Estimates from the 1999–2000, 2001–2002, and 2003–2004 National Health and Nutrition Examination Surveys (NHANES) as reported by Ganji & Kafai (2009).

^c Estimates include both male and females

Descriptive statistics on the breakdown of the biomedical data using the FWFHP norms are provided in Table 9. In addition to biomarkers, health information including health complaints and medication usage related to hypertension and/or diabetes was collected (see Table 9). A majority of participants indicated experiencing muscular pain (72%) and over a third reported having dental pain (39.6%). In addition to muscular and dental pain, common health complaints included headaches, eye/vision concerns, gastrointestinal problems, fatigue, upper respiratory infections, and dermatological issues. Overall, few participants indicated taking medication for health concerns and only three out of the 26 men who had abnormal blood pressure readings (i.e., an abnormal systolic and/or diastolic blood pressure reading) and one out

of the 46 men with abnormal glucose level readings took medication to help control related health symptoms.

Table 9

Descriptive Statistics for Physical Health Information and Biomedical Markers using FWFHP

Norms

Variable	<i>n</i> or <i>M</i>	% or SD	Min.	Max.
Blood Pressure Systolic, <i>M</i> (SD)	125.37	11.51	100	178
Normal, <i>n</i> (%)	94	83.2%		
Abnormal, <i>n</i> (%)	19	16.8%		
Blood Pressure Systolic, <i>M</i> (SD)	76.64	9.50	50	102
Normal, <i>n</i> (%)	96	85%		
Abnormal, <i>n</i> (%)	17	15%		
Hemoglobin (Hgb) , <i>M</i> (SD)	13.89	1.45	8.3	16.9
Normal, <i>n</i> (%)	62	54.9%		
Abnormal, <i>n</i> (%)	51	45.1%		
Glucose Level, <i>M</i> (SD)	118.5	43.16	49	418
Normal, <i>n</i> (%)	67	59.3%		
Abnormal, <i>n</i> (%)	46	40.7%		
Muscular Complaint, <i>n</i> (%)				
No	28	28%		
Yes	72	72%		
Dental Complaint, <i>n</i> (%)				
No	61	60.4%		
Yes	40	39.6%		
Medication Usage, <i>n</i> (%)				
No	98	96.1%		
Yes	4	3.9%		

Note. The sample size varies for each variable depending on missing data and consent allowing for usage of health data.

Self-Rated Health. As discussed above, given the negatively skewed distribution of self-rated health, this variable was removed from the primary analyses as a dependent variable. However, the relationship between continuous study variables and participants that rated their health as average and above and those that rated it below were examined using point-biserial correlation analyses. As such, self-rated physical health was recoded into a dichotomous variable

based on the cut-offs provided by Vega, Warheit, & Palacio (1985). Participants who indicated that their health was average or below ($n = 37$) were coded as 0 and those who indicated that their health was above average ($n = 83$) were coded as 1. Point-biserial correlations were conducted to examine the relationship between self-rated health and all continuous study variables. As shown in Table 10, significant negative associations were found between self-rated health and psychological health variables, whereby participants who reported having better than average health had significantly lower levels of depressive symptoms and anxiety. Additionally, significant positive relationships were found between self-rated health and several asset variables. Specifically, participants with better self-rated health had significantly higher levels of religiosity and PWB. Finally, given that this is one of the first studies to simultaneously examine self-rated and biomedical physical health, a Spearman correlation was conducted to examine the relationship between the two variables. Results indicated a significant negative association such that better self-rated physical health was related to lower “counts” of biomedical risks, $r = .17, p < .05$.

Table 10

Point-Biserial Correlation Analyses for Self-Rated Health and Continuous Study Variables

Variable	r_{pb}	Sig.
Depressive Symptoms	-.23	.01
Anxiety	-.24	.01
MSFW Stress	-.06	.26
Social Support	-.04	.34
Calling Home	.12	.09
Religiosity	.23	.01
Psychological Well-Being	.15	.04

Psychological Health

Psychological Health Status. Depression scores on the CES-D short-form ranged from 0 to 26 with a median of 9. The CES-D provides a specific symptom threshold that designates “caseness,” and individuals who reach this level of severity are considered to be at significant risk for depression and in need of mental health services. Nearly half of the sample (40.8%) reported frequency of depressive symptoms that reached caseness. This is a much higher percentage when compared to caseness frequencies for the general population (18%-20%), but is relatively similar to the prevalence rates found for MSFWs in other states (Texas: 41%; Mid-west and Eastern US: 38%-42%) with the exception of California (21.1%).

Due to the adaptations made to the response scales of the PAI, procedures for calculating standardized cut-off scores (Morey, 1991), and comparison of prevalence rates amongst other studies, could not be conducted for this sample. However, the average anxiety score was below the midpoint of the possible range (see Table 7), suggesting that MSFWs in this sample had relatively lower levels of anxiety. Similarly, the mean of MSFW stress and depressive symptoms were also below the midpoint of the possible range, whereas average scores for all asset variables were greater than the midpoint.

Nervios. The prevalence rate of *nervios* in the current sample was 21%. Similar to self-rated health, given the positively skewed distribution, this variable was removed from the primary analyses as a dependent variable and further examined using point-biserial correlation analyses. As such, *nervios* was recoded into a dichotomous variable whereby participants who denied experiencing *nervios* ($n = 94$) were given a score of 0 and those that reported experiencing it ($n = 25$) were given a score of 1. As shown in Table 11, significant positive associations were found between *nervios* and psychological health variables, whereby

participants who reported experiencing *nervios* had significantly higher levels of depressive symptoms, anxiety, and MSFW stress. Additionally, a significant positive relationship was found between *nervios* and calling home such that participants who endorsed experiencing *nervios* called home more often than those who did not report experiencing it.

Table 11

Point-Biserial Correlation Analyses for Nervios and Continuous Study Variables

Variable	r_{pb}	Sig.
Depressive Symptoms	.32	.00
Anxiety	.48	.00
MSFW Stress	.28	.00
Social Support	.08	.18
Calling Home	.22	.01
Religiosity	.02	.43
PWB	-.02	.42

Primary Analyses: Regression Models.

The second aim of the current study was to *replicate, integrate, and build upon* previous research to identify potential risk, asset, and protective factors for health outcomes in a sample of Georgia MSFWs. Ordinary least squares regression models were fit for the depression and anxiety outcomes, but a Poisson regression model was used for the biomedical index because it was a count variable with a positively skewed distribution. In order to examine potential risk, assets, and protective factors, the following models were tested. In model one, hypothesized and integrated risk (i.e., MSFW stress) and asset variables (i.e., social support, call home, religiosity, PWB, and farm worker expectations) were entered together to examine the main effects of the variables on each health outcome (*Hypothesis 1 and 2*). Notably, entering risk and asset variables simultaneously allows for the test of effects of assets within varying risk contexts

(versus statistically controlling for risks with hierarchical entry). In order to maximize degrees of freedom and minimize collinearity, hypothesized and integrated interaction terms were entered separately into the model that included all risk and asset variables. In the second model, the block of hypothesized interaction terms (i.e., stress by social support, stress by call home, and stress by religiosity) were included in the regression analyses in order to examine the effect of hypothesized moderators on the stress-health outcomes relationship (*Hypothesis 3a*). In the third model, the block of hypothesized interaction terms was replaced with the block of integrated interactions (i.e., stress by PWB and stress by farm worker expectations) in order to examine the potential effect of the integrated moderators on the stress-health outcomes relationship (*Hypothesis 3b*). If no significant hypothesized or exploratory interactions were found, main effects were interpreted from the first regression model.

Biomedical Health. *Hypothesis 1* and *2* were tested with a simultaneous Poisson regression which was conducted to examine the association between risk and asset variables as predictors of biomedical health while controlling for age and medication usage. Two sets of hierarchical multiple regressions were then conducted to determine whether the hypothesized and integrated asset variables moderated the association between MSFW stress and biomedical health outcomes. Unlike OLS regression, Poisson regression does not provide a variance explained statistic. Instead, it provides a deviance statistic which tests for the goodness of fit of the model. Changes in deviance scores were examined for all 3 sets of regressions to determine whether the model was better defined with the addition of first the hypothesized interaction terms and then the integrated interaction terms. Examination of the change in deviance scores revealed that the inclusion of the hypothesized interaction terms did not significantly increase the goodness of fit of the model, $X^2(3) = 6.14, p > .05$. However, the change in deviance scores

between the model including only the main effects and the model including the integrated interaction terms was significantly different, $X^2(2) = 6.39, p < .05$. Thus, statistics were interpreted from the model that included the main effects and integrated interaction terms.

As shown in Table 12, a significant interaction was found in which the effect of stress on biomedical health was significant when farm worker expectations were worse than expected. However, the effect of stress on biomedical health was no longer significant when farm worker expectations were accurate, $\beta_{\text{stress}} = -.01, p = .31$, (see Figure 1). Thus, for farm workers whose experiences were worse than expected, higher levels of stress were related to higher levels of biomedical risk indicators. This relationship between stress and biomedical health did not exist for those workers whose experiences met or were better than their expectations. No other asset variables were found to negatively predict biomedical health or moderate the relationship between stress and biomedical health.

Table 12

Regression of Biomedical Health on Risk, Assets, and Integrated Moderators

Variable	<i>b</i>	Std. Error	95% Wald CI		Wald <i>Chi-Square</i>	Sig.
			Lower Bound	Upper Bound		
Age	.02	.01	-.00	.04	2.76	.10
Medication Usage	.83	.39	.05	1.60	4.38	.04
MSFW Stress	.04	.02	-.04	.01	3.95	.04
Social Support	.00	.02	-.03	.04	.04	.85
Calling Home	.08	.12	-.14	.31	.52	.47
Religiosity	.02	.07	-.11	.15	.11	.74
PWB	.01	.01	-.02	.03	.46	.50
Farm Worker Expectations	.07	.26	-.58	.45	.06	.80
Stress X PWB	.00	.00	-.00	.00	.01	.94
Stress X FW Expectations	-.05	.02	.01	.10	4.72	.03

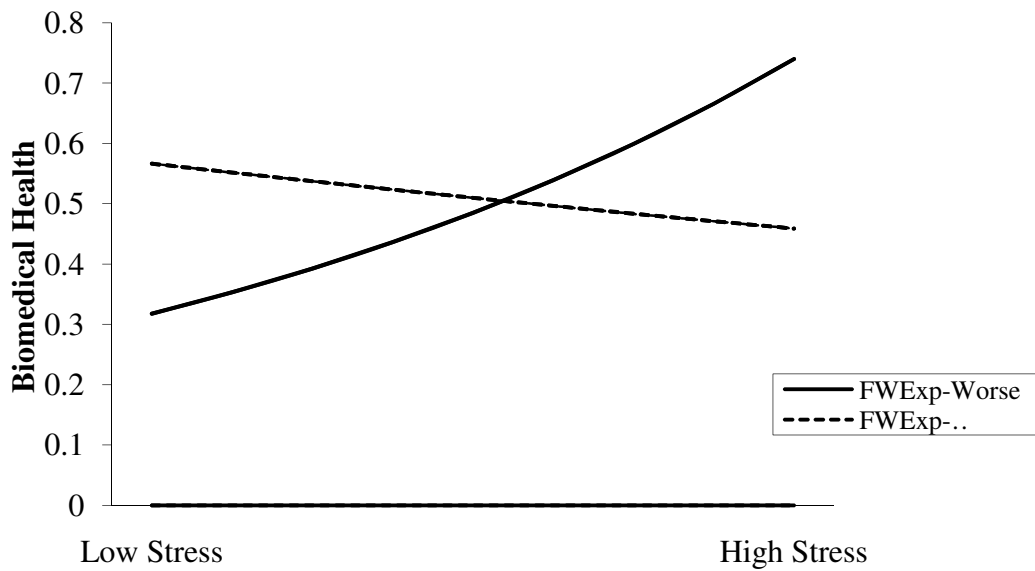


Figure 1. The Relationship between MSFW Stress and Biomedical Health as Moderated by Farm Worker Expectations

Depressive Symptoms. In order to test the first and second hypotheses, a simultaneous multiple regression was conducted to examine the association between risk and asset variables as predictors of depressive symptoms. The model including stress, social support, calling home, religiosity, PWB, and farm worker expectations accounted for 32% of the variance in depressive symptoms, $F(6,112) = 10.07, p < .01, R^2_{adjusted} = .32$. In order to test for the third hypothesis, two sets of hierarchical multiple regressions were conducted to determine whether the hypothesized and/or integrated asset variables moderated the association between MSFW stress and depressive symptoms. Analyses revealed that neither the hypothesized set of interactions, $F_{change}(3,109) = .28, p = .84, R^2_{change} = .01$, nor the integrated set of interactions, $F_{change}(2,110) = .24, p = .79, R^2_{change} < .01$ accounted for a significant amount of variance change in depressive symptoms. Thus, interactions were removed from the regression model and main effects were interpreted from the first regression.

As hypothesized, MSFW stress level was found to be a significant risk factor for depressive symptoms and PWB and farm worker expectations were found to be significant asset variables that were negatively related to depressive symptoms (see Table 13). The main effect for both social support ($p = .07$) and religiosity ($p = .08$) approached significance ($p < .05$), such that higher levels on both variables were negatively associated with depression. Contrary to the hypothesis, calling home was *positively* related to depression. In sum, higher levels of asset variables including social support, religiosity, PWB, and accurate farm worker expectations, were related to *lower* levels of depressive symptoms, whereas higher levels of both stress and calling home were related to *higher* levels of depressive symptoms.

Table 13

Regression of Depressive Symptoms on Risk and Asset Variables

Variable	<i>b</i>	Std. Error	95% CI _{<i>b</i>}		<i>t</i>	Sig.
			Lower Bound	Upper Bound		
MSFW Stress	.17	.05	.08	.26	3.69	.00
Social Support	-.14	.08	-.29	.01	-1.81	.07
Calling Home	1.57	.43	.71	2.43	3.63	.00
Religiosity	-.46	.26	-.99	.06	-1.77	.08
PWB	-.19	.06	-.30	-.08	-3.31	.00
Farm Worker Expectations	-2.24	1.05	-4.32	-.17	-2.14	.03

Anxiety. In order to test the first and second hypotheses, another simultaneous multiple regression was conducted to examine the association between risk and asset variables as predictors of anxiety. The model including stress and all 5 asset predictor variables accounted for 46% of the variance in anxiety, $F(6,112) = 17.89$, $p < .01$, $R^2_{adjusted} = .46$. In order to examine the third hypothesis, two sets of hierarchical multiple regressions were again conducted to determine

whether the hypothesized and integrated asset variables moderated the association between MSFW stress and anxiety. Similar to the findings for depressive symptoms, neither the hypothesized set of interactions, $F_{change}(3,109) = 1.03, p = .39, R^2_{change} = .01$, nor the integrated set of interactions, $F_{change}(2,110) = .19, p = .83, R^2_{change} < .01$ accounted for a significant amount of variance change in anxiety. Thus, interactions were removed from the regression model and main effects were interpreted from the first regression.

As shown in Table 14, MSFW stress level was found to also be a significant risk factor for anxiety. PWB was found to be an asset variable such that higher positive well-being was related to less anxiety. Additionally, there was a main effect for farm worker expectations ($p = .06$) that was approaching significance ($p = .05$), whereby farm workers whose expectations were accurate had lower levels of anxiety than those whose expectations were worse than expected. In sum, as asset variables including PWB and work expectations increased, anxiety decreased. No asset variables were found to moderate the significant positive effect of stress on anxiety.

Table 14

Regression of Anxiety on Risk and Asset Variables

Variable	<i>b</i>	Std. Error	95% CI _{<i>b</i>}		<i>t</i>	Sig.
			Lower Bound	Upper Bound		
MSFW Stress	.96	.13	.70	1.21	7.44	.00
Social Support	.14	.22	-.29	.57	.66	.51
Calling Home	1.58	1.22	-.83	3.99	1.30	.20
Religiosity	-.53	.74	-2.00	.93	-.72	.47
PWB	-.49	.16	-.80	-.17	-3.05	.00
Farm Worker Expectations	-5.63	2.95	-11.48	.21	-1.91	.06

Discussion

Across the regions of the U.S., a growing body of research indicates that MSFWs are at increased risk for experiencing physical health difficulties and elevated levels of psychological distress. The significant stressors associated with the structural features of being a farm worker (e.g., have to migrate to work, low pay, difficulties attaining permanent employment, etc.), the physical conditions of the work place and living environments (e.g., inadequate availability of water to drink or toilets in the fields, poor housing, etc.), the features of farm work itself (e.g., among the most dangerous occupations in U.S., pesticide exposure, physically demanding, long hours, awkward positioning, harsh weather conditions, little control over job and work-place, etc.), and the social circumstances (e.g., leaving family and friends behind in country of origin, food insecurity, social marginalization, immigration and deportation concerns, discrimination, etc.), underscores the importance of increasing knowledge of this population to inform health and social service interventions as well as health services policy (Grzywacz, 2009).

The purpose of the present study was two-fold. First, this study sought to gain a better understanding of the physical and psychological health functioning of MSFWs in Georgia, a state heavily reliant on farm worker labor where relatively few research studies with MSFWs have been conducted to date. The second aim of this study was to utilize a resilience framework to: 1) *replicate* prior findings regarding risk and asset variables associated with health functioning from studies using MSFWs located in other states; 2) *integrate* findings on PWB and farm worker expectations that have shown to be promising asset factors in the previous general population and MSFW literature; and 3) *build upon* prior research by examining previously identified asset variables as protective factors that moderate the stress-health outcomes relationship. This study's identification of potential modifiable risk, asset, and protective factors

has significant implications for practice as an understanding of these variables can be used to develop community-based programming and interventions. Furthermore, the study has implications for better informed policy development and advocacy with this marginalized population. In accordance with the aims of the present study, the next sections will first discuss the physical and psychological health of the present sample, followed by a discussion of identified risk, asset, and protective factors in Georgia MSFWs.

Understanding MSFWs in Georgia

Demographic Characteristics. The last known study documenting the demographic characteristics of Georgia MSFWs was published in 1995 (Winders et al., 1995). Although findings from the current study come from a relatively small convenience sample and are not considered to be representative of all Georgia farm workers, information detailing demographic characteristics is important to building a larger knowledge base for this population.

Overall, when compared to the national demographic profile of hired farm workers (Carroll et al., 2005), MSFWs in the current sample were younger, and had a larger percent identifying as Mexican, unaccompanied, and belonging to an indigenous group in Latin America. Although the current sample largely differed demographically from the national profile of MSFWs, these characteristics are similar to MSFWs living in the Eastern U.S. (Aguirre International, 2005ab; Arcury & Marín, 2009). Notably, many of these differences have also been cited as potential explanations for why Eastern MSFWs generally have poorer health outcomes compared to those living in other regions of the U.S.

For example, as found in the current study, there are a greater percentage of workers in the Eastern U.S. who come unaccompanied as opposed to traveling with family (Arcury & Marín, 2009). Unaccompanied farm workers have been found to have poorer working and

housing conditions as well as less access and more barriers to U.S. medical care, when compared to those farm workers who come with family (Ward, 2010). Similar to the current study, a greater percentage of farm workers in Eastern regions of the U.S. identify as indigenous compared to national estimates (Arcury & Marín, 2009). Indigenous workers face a number of unique stressors such as “double discrimination” by both the mainstream U.S. population and other non-indigenous farm workers. These factors place them at greater risk for ill-health (Holmes, 2006; Farquhar et al., 2008abc). Findings indicate that indigenous farm workers tend to be given more physically taxing jobs, live in housing that is more crowded and in poorer condition, experience more degrading treatment by supervisors, be exposed to pesticides more frequently when compared to non-indigenous Latino farm workers, and have more difficulty accessing health care and other services as interpreters for indigenous languages are rare (Holmes, 2006; Farquhar et al., 2008abc; Arcury & Marín, 2009).

Furthermore, similar to other studies conducted with MSFWs in the eastern region of the U.S., the majority of MSFWs in the current sample reported living in dormitory styled barracks, often provided by the grower and located adjacent to fields in which they worked. Although not specifically examined in the current study, previous findings suggest that this type of housing can lead to elevated levels of distress as housing is typically located in remote areas in which transportation is needed to access food, entertainment, church, healthcare services, and other resources (Vallejos, Quandt, & Arcury, 2009; Grzywacz, 2009).

Taken together, these findings suggest that although demographically different from the national profile of MSFWs, the current sample is similar to the Eastern region profile of MSFWs; a region characterized in the literature as having increased risk for poor health outcomes. Given that the current sample of MSFWs was largely demographically different

from the national sample, the generalizability of this study's findings for MSFWs beyond the Eastern region of the US should be taken into account and any comparisons must be undertaken with caution.

Implications for Health Status

Physical Health. Despite the risk factors noted above, the current sample of MSFWs was generally in good biomedical health on two of the biomedical health indices. Compared to MSFWs in California (Villarejo et al., 2010), as well as the U.S. general and Latino populations (US DHHS, 2010), the current sample had significantly lower rates of high blood pressure and similar rates of elevated glucose. Likewise, on the men's subjective rating their of health status no differences were found between the percentage of men in the current sample and either the U.S. general or Latino population with regard to who rated their health status as "poor". Thus, similar to the blood pressure and glucose findings, most of the MSFWs in the current sample reported being in good health.

Although MSFWs in the current sample perceived themselves as in good health and had healthy blood pressure and glucose levels, approximately 1 out of 3 had blood hemoglobin levels below the cut-off point for iron-deficiency anemia (World Health Organization, 2001). Although previous studies have reported that MSFWs have elevated rates of anemia (Hansen & Donohoe, 2003; Holmes, 2006; Villarejo et al., 2000), the rates found in the current sample far exceeded those found in other samples. For example, the prevalence of low Hgb was about 6 times greater in the current sample than among comparable groups of MSFWs in California and over 10 times greater than comparable groups of U.S. men. Further analyses of FWFHP biomedical data from 2008 and 2009 provided confirmatory support that the elevated prevalence rate of low Hgb in the 2010 sample was not an anomaly. These significantly elevated rates are especially alarming, as

anemia is associated with fatigue, dizziness, low energy, and concentration difficulty (Hull & Runyan, 1990). Moreover, these specific symptoms can be particularly problematic for workers whose productivity is directly tied to their income, and indeed dangerous for workers who operate machinery or climb ladders in order to harvest certain crops (NIH, 2011).

Notwithstanding the elevated levels of hemoglobin, these findings were unexpected given the number of earlier studies that found MSFWs to have poor health outcomes (Hansen & Donohoe, 2003; Villarejo et al., 2000; Villarejo, 2003; NCFH, 2003abc). A possible explanation for the current results may be related to what researchers have referred to as the “Latin@¹ health paradox” [i.e., the seemingly paradoxical finding that Latin@s in the U.S. tend to have health outcomes that are comparable, or better than the general population, despite generally low socioeconomic status (Acevedo-Garcia & Bates, 2007)]. Similarly, findings indicate that Latin@s are healthier when they first arrive in the United States; however, they become less healthy physically and psychologically after acculturation and time spent in the U.S. (Taningco, 2007; Hayes-Bautista, 2002).

Most MSFWs in the current sample were relatively recent immigrants, having been in the U.S. for six years or less. In comparison, most of the male farm workers included in the California CAWHS sample (used for biomedical health comparison; Villarejo et al., 2010) had been working as farm laborers in the U.S. for more than a dozen years (median 13 years). Thus, the deleterious effects of farm labor and immigration delineated above may accrue only over time, and not be seen until several more years of this work accumulate.

¹ “Latin@” is used to refer to both Latinos and Latinas. The “@” is increasingly being used in published literature and other writings in Latin American countries in place of the masculine “o” when referring to people or things that are either gender neutral or both masculine and feminine in make-up, in an attempt to equalize the gender discrepancy inherent in the Spanish language.

Additionally, it has been suggested that the Latin@ health paradox may be explained by the “healthy migrant effect”. This rationale suggests that people who elect to migrate are selectively healthier when compared to the rest of their home-country population (Palloni & Morenoff, 2001). For example, with regard to migration, enduring the hardship of crossing the most highly protected international border in the Western Hemisphere may “select for” only the most physically able individuals to make the journey to the U.S. The “healthy migrant effect” may be especially relevant to MSFWs as this population is typically younger and must be in good physical health to be able to engage in long hours of taxing manual labor. Similarly, it has been suggested in the MSFW literature that there is a “healthy worker bias” in which morbidity and mortality data may be skewed lower in those populations studied due to many farm workers returning to their home countries as they age or become disabled (Villarejo, 2003). In other words, it is possible that those who were not able to adequately manage the work demand, especially due to age, illness, or injury, did not persevere as farm workers, and thus healthier individuals were over-represented in the current sample.

Notably, this was the first study of Georgia MSFWs and one of the first investigations of MSFWs in the U.S. to examine physical health using both self-report and physical exam in the same study. Correlation analyses indicated a significant association between MSFWs self-rated health and their biomedical risk index. This finding has important implications for future physical health studies, as physical exams can be costly and require multiple resources (e.g., medical equipment, health care providers, lab analyses, etc.) that make biomedical data difficult to collect. However, given that the current sample is relatively healthy and differs in unique ways from the national representative profile of MSFWs, the correlation between self-rated and biomedical health may be specific to this sample, and thus generalizing this finding should be

done with caution. In other words, it would be inappropriate to use only the results of the current study to justify the use of only subjective self-reports of health, and neglecting to collect biomedical data when examining MSFW health status and its correlates. Furthermore, although there was a significant relationship between self-rated health and depressive symptoms and anxiety, this relationship was not found between psychological health variables and the biomedical index. This lack of criterion validity provides further reason to interpret this correlation cautiously.

Psychological Health Status. Nearly half of the sample reported frequency of depressive symptoms that reached or exceeded the threshold of caseness on the CES-D. Although this proportion is higher than that found in the general population, it is comparable to estimates found for MSFWs located in the Eastern and Midwestern regions of the U.S. (Grzywacz, 2009). Unfortunately, similar cross sample comparisons for the prevalence of anxiety could not be explored due to the adaptations made to the PAI response scale. However, further examination of the psychological health data indicated that the average anxiety score in the current sample was below the midpoint of the possible range. This finding was also consistent for MSFW stress and depressive symptom variables, whereas the averages for all continuous asset variables were found to be above the midpoint of the possible ranges. Taken together, these findings suggest that the current sample of farm workers had relatively lower levels of psychological health symptoms and relatively higher levels of psychosocial assets including social support, calling home, religiosity and PWB. A caveat in interpreting the level of stress and depression in this group is suggested in an earlier study by Grzywacz et al. (2010). These authors found that the prevalence of depressive symptoms changes across the agricultural season, with the highest rates of depression found in the beginning of the agricultural season

(May), a steady decline in the middle (June, July) and then an increase again in the later stages of the season (August). Notably, the current study was conducted in late June, a time that Grzywacz et al. (2010) point out is comparatively low in psychological distress compared to other times during the season. Given the cross-sectional nature of the findings, it is possible that MSFWs in the current sample had recovered from the initial stress of migration and the emotional difficulty associated with leaving family and friends behind to seek agricultural employment in the U.S. Thus, the varying levels of depression and other indicators of psychological distress that are found across different studies may be an artifact of the particular point during the agricultural season that the data were collected.

Nervios. The prevalence of *nervios* in the current study was 21%. This rate is somewhat lower when compared to those found in MSFWs residing along the U.S.-Mexico border (Weigel et al., 2007), but comparable to other samples consisting of the general Mexican population (Bayles & Katerndahl, 2009; Salgado de Snyder, Diaz-Perez, & Ojeda, 2000). Given that many of the somatic and affective symptoms associated with *nervios* are also commonly found for depression and generalized anxiety disorders (Salgado de Snyder, Diaz-Perez, & Ojeda, 2000), it was not surprising that *nervios* was found to be positively associated with psychological health outcomes and MSFW stress. Notably, although *nervios* was correlated with depressive symptoms, the prevalence of MSFWs who met caseness on the CES-D for depression was almost two times greater than the prevalence of men who indicated experiencing *nervios*. This finding gives support for *nervios* as a distinct construct in which its presence is not necessarily indicative of psychopathology. As indicated in previous research, *nervios* can be better understood as a “cry for help,” that if left untreated, could develop into more serious psychological illness (Salgado de Snyder, Diaz-Perez, & Ojeda, 2000). Thus, given the sizable

prevalence rate of *nervios* found in the sample as well as the potential for *nervios* to manifest into more serious problems, is it important that future interventions with this population target *nervios*.

Risk, Asset, and Protective Factors for MSFW Health Outcomes

In addition to describing the physical and psychological health of a sample of Georgia MSFWs, this study aimed to *replicate* and *build upon* prior research with MSFWs as well as *integrate* promising findings from the general population and MSFW literature. Notably, the cross-sectional design of the study precluded the ability to infer causation. For example, it is possible that depressive symptoms influence the way participants responded to questions about stress or PWB. Nevertheless, the following results have important implications for both intervention and prevention efforts with this population.

Biomedical Health. Accurate farm worker expectations were found to be a protective factor for biomedical health such that those farm workers whose experiences matched and exceeded their expectations were protected from the negative effects of stress on biomedical health. In other words, having accurate expectations buffered the effect of stress on biomedical health. This finding can be understood within the context of stress and expectancy violation theory (EVT; Burgoon, 1978). Turning to theories of stress, it is posited that a situation must be appraised as problematic in order for it to elicit a stressful response (Lazarus & Folkman, 1984). EVT builds upon this tenet by suggesting that an individual's appraisal of a situation, and hence their reaction to it, occurs within the context of previous held expectations. Thus, when an individual's experiences exceed previously formulated expectations, this leads to positive appraisals and subsequent positive reactions to a situation. Conversely, when expectations are

unmet or violated, this leads to negative appraisals of the situation resulting in stress-producing reactions.

Within the context of the current study, it is possible that those MSFWs who had high pre-migration expectations about what farm work would be like, and then came to find that their experience in the U.S. were not at all what they had hoped or expected, were more likely to appraise their current situation as negative. This negative appraisal thus triggered a negative stress reaction; a reaction that has been well established in the literature as being related to poor biomedical health. However, if MSFWs found that their life and work in the U.S. were what they expected or better, it is likely that they did not appraise their current life and work as problematic and thus, the stress reaction did not get triggered. Although this finding has particular relevance for farm workers who were migrating for their first time, it is also applicable for returning farm workers who may base their expectations on previous work experiences. If these farm workers were expecting a comparable work situation to years past and came to find that their experiences were worse, this violation likely had an adverse impact.

Outside of the significant stress by expectations interaction, no other asset or protective variables were found to be related to biomedical health. As discussed above, the current sample of MSFWs were relatively healthy across biomedical indicators; suggestive of a group of self-selected men that can physically endure not only the migration to the U.S., but the strenuous demands of farm labor. Given the cross-sectional design of this research, it is possible that the known cumulative negative effects of stress on biomedical health may not have manifested yet, and would be better captured in a longitudinal study design. Furthermore, it is likely that the men who have had their biomedical health impacted by MSFW stress were not represented in the current sample as they may no longer be able to physically perform the demands required for

farm work and already left the fields. As suggested by Grzywacz (2009), future prospective cohort studies that recruit and follow MSFWs across and over agricultural seasons are needed to document patterns of farm worker biomedical (and psychological) health over time.

Notably, farm worker expectations was the only significant finding for biomedical health and the only significant protective factor (i.e., moderator) found across all three health outcomes. As suggested by other resilience researchers (see Luthar & Zelazo, 2003), protective factors (i.e., interaction effects) can be difficult to find in cross-sectional, variable-based analyses. The relatively small sample size as well as the relatively low alphas for some of the moderators (McClelland & Judd, 1993; Rutter, 2003) may not have produced enough statistical power to detect an effect. Furthermore, the lack of significant interaction effects across health outcomes could be an artifact of the relative homogeneity of this group of MSFWs. If comparisons were to involve a Caucasian sample of American-born labor workers per se, it is likely that substantive differences would emerge in salient predictors (Owens & Shaw; 2003). Thus, it is possible that the hypothesized asset variables do have protective features; however, given the small sample size, limited magnitude of the interaction effects, relative homogeneity of the group, and cross-sectional design, the significant moderating effects were not statistically evident. Thus, other approaches to examining resilience and protective factors in this population are warranted.

Psychological Health. As discussed above, contrary to *Hypothesis 3*, no interaction terms were significant in either the depressive symptoms or anxiety models, thus, the main effects of the risk and asset variables were interpreted. As predicted in *Hypothesis 1*, MSFW stress was found to be related to adverse psychological health outcomes. This finding replicates previous research that has consistently found a significant relationship between both MSFW stress and depressive symptoms as well as MSFW stress and anxiety (Hovey & Seligman, 2005;

Ward & Tanner, 2010; Hiott et al., 2008; Hiott et al., 2006). Notably, as discussed above, MSFW stress *was not* found to be related to biomedical health outside of its interaction with farm worker expectations. However, it is possible that psychological health problems are a precursor to physical health problems; an indicator that there is an imbalance which, if left untreated, can eventually diminish biomedical health. Thus, given the strong relationship found between stress and psychological health in this sample, it is likely that with time, the detriments of stress will accrue to adversely influence biomedical health outcomes.

Contrary to *Hypothesis 1* and previous findings from other Eastern region MSFW samples (Grzywacz et al., 2006b), calling home was found in the current study to be *positively* related to depression. In the current sample, it is possible that calling home exacerbates distress as men learn about difficulties back home or realize they have missed important events (Grzywacz et al., 2005; Hovey & Magana, 2002a). As an example of the complexity and struggles of connecting with family back home, the following statements were captured in a study conducted by Hovey and Magana (2002a):

“It is difficult when you call family and friends and they say they want us to come back because they want to see us. It is difficult to talk to them because we don’t know if we will ever see each other again. Because I am already here, I might as well deal with the separation and lack of support a little longer. My family in Mexico needs money to buy food because it is hard to make money in Mexico. It feels terrible when you know that loved ones are sick in Mexico and you don’t know if you will find work to help them.”

The sentiments depicted in this caption portray the struggles of being away from loved ones as well as the ambivalence of staying connected to the comings and goings of the family that has been left behind. It is possible the struggle and ambivalence inherent in calling home is what is associated with increased depressive symptoms found in the current sample.

Although the causal association proposed above may be accurate, it is important to note that the cross-sectional design of the study does not allow for the direction of this relationship to be inferred. Thus, an alternative explanation for the unexpected *positive* relationship between calling home and depressive symptoms could be that calling home was a coping strategy for men who were depressed. In other words, having depressive symptoms may have led to calling home more frequently. It is possible that calling home is a way to gain more access to support and feelings of belonging and connection, which in turn, may serve to help depressed MSFWs cope with distress. Future research elucidating the causality of this relationship, as well as the emotional results (e.g., do MSFWs feel a sense of *relief* or *grief* after calling home), could prove useful for intervention development. For example, depending on the findings from the research it may be beneficial to advocate for more access to phones; however, if findings suggest that calling home causes more grief, intervention efforts and resources might be better utilized helping men cope with the ambivalence of being away from family.

With regard to *Hypothesis 2*, PWB was found to be a significant asset variable in relation to psychological health outcomes. Given that one of the aims of the study was to integrate promising findings from extant general population literature, the significant inverse link to psychological ill-health suggests that positive well-being is a construct worthy of inclusion in future studies with MSFWs. In addition to looking at PWB as an asset variable, as suggested in the resilience research (Luthar & Zelazo, 2003) there are benefits to looking at it as an outcome variable as well. Examining PWB as an outcome would allow MSFW researcher to being to identify processes and correlates that are related to increased PWB, a variable that the current study has shown to be important in relation to adverse psychological outcomes.

In addition to the relevant implications of PWB in MSFW research, qualitative observation suggested that the participants in the current sample enjoyed answering these questions. Purposefully, the PWB scale items were placed at the end of the survey so as to end on a “positive note.” Given that the majority of the questions asked in the survey tended to be more deficit-focused, (i.e., have you ever experienced XYZ stressor?, how often do you feel lonely?, on a scale of 1-5, how much do you worry?, etc.), the men seemed to take notice of the change in focus and provided comments like “these questions are different” and “I like these questions.” Other men commented on how the PWB items made them reflect on their lives and that they appreciated this. Thus, in addition to the important implications of the findings, the PWB questions, and this line of strengths-focused questions, can potentially have positive consequences for participants.

In addition to PWB, as predicted in *Hypothesis 2*, farm worker expectations was found to be an asset variable across psychological outcomes. As discussed in detail above, it is likely that the match or mismatch between individuals’ expectations and their actual experiences colors the lens through which they make sense of their experiences and world. It is this appraisal which then goes on to impact functioning, and in this case, psychological functioning. Although not significantly related in the current sample, several researchers have given a similar explanation for the contradictory finding of high education levels being related to poorer psychological health in their MSFW study samples (Hovey & Magaña, 2002abc; Hiott et al., 2008). These authors concluded that MSFWs with more education may be at greater risk for psychological problems because they may have greater insight into the discrepancy between their current life conditions and those of other individuals in the United States. Similarly, in an additional study, MSFWs who were not able to find employment and send money home as they had expected

were found to have poor psychological outcomes compared to those workers whose realities matched their expectations (Grzywacz, Quandt, Arcury & Marín, 2005). Taken together, violated expectations, whether they be about the expected experiences of farm work in the U.S., what life should be like in comparison to other individuals in the U.S., or expected employment and ability to send remittances home, likely have a significant negative impact on psychological health functioning.

Implications for Prevention, Intervention, and Policy

Taken together, findings from this study including elevated prevalence of depressive symptoms and *nervios*, as well as the significant relationship found between stress and psychological health outcomes, underscore the critical need for the provision of mental health services in the population. As outlined by Grzywacz (2009), the need for mental health services is especially great for those MSFWs living and working in the Eastern regions of the U.S. However, given a number of barriers (e.g., language, culture, access, time spent away from work, stigma, limited funding and resources for mental health care in rural areas, migratory employment that is not conducive to long-term therapies, etc.), very few psychological health services exist for MSFWs.

With regard to the findings from the current study, interventions targeted at increasing identified assets in this population may prove fruitful. For example, PWB was found to be a significant asset related to better psychological health in this sample. As such, mental health care services could include Positive Psychology Interventions (PPIs), as a potential treatment option. PPIs show promise for use with MSFWs as they are effective, short-term interventions in which depressive symptoms have been found to reduce as a byproduct of the therapy's focus on positive attributes and increasing individuals' strengths (Sin & Lyubomirsky, 2009).

Furthermore, although limited support for protective factors was found in this study, Masten (2001) suggests that asset variables likely have an “additive-effect” such that more resources/assets theoretically lead to better outcomes. Thus, intervention efforts that work to build competence across multiple assets will likely lead to better health outcomes.

Given that farm worker expectations was the one variable found to not only be related to better psychological health, but to protect against the adverse effect of stress on biomedical health, prevention and interventions efforts aimed at increasing accurate expectations about life and work experiences in the U.S. is critical. With regard to prevention, efforts aimed at accurately portraying a depiction of the benefits of farm work (e.g., the potential to earn money), within the framework of the inherent stressors (e.g., in order to earn money, you may first owe money to the person who brought you over the border to work, you must harvest an hourly quota of produce otherwise you may get fired, this means that you may not get bathroom breaks and you will not be able to stop to eat lunch, etc.), may help reduce the dissonance between expectations and reality for pre-migrating farm workers. Additionally, future research could explore where workers get their information about agricultural work and life in the U.S. Gaining a better understanding of the origin of expectations can further elucidate where the focus of these prevention efforts should be directed. Furthermore, prevention efforts done in collaboration with the H-2A visa program could also prove useful to both workers and growers. Given the robust finding of farm worker expectations as a protective factor for poor physical health and an asset variable for psychological health, it is likely that having accurate expectations would lead to a work force with good health functioning, likely increasing productivity in the work place. Thus, given that the H-2A visa program is a highly regulated governmental program with specified contractual requirements for the growers, targeting prevention efforts through this program could

prove effective in prevention dissemination efforts. With regard to interventions, previous EVT researchers have suggested the benefits of providing psycho education on the negative impact of unrealistic expectations in conjunction with culturally tailored coping skills training that would help MSFWs better negotiate the demands of their work (Negy, Schwartz, & Reig-Ferrer, 2009). Given the increasing “anti-immigrant sentiment” at both national and state levels (Ransford, Carrillo, & Rivera, 2010), and the recent passing of the HB 87 Immigration Reform Bill in the state of Georgia, dissemination of accurate information on the realities of farm work may be particularly relevant for returning migrant farm workers. If these farm workers are expecting a comparable work situation to years past and come to find that their experiences are worse, this violation will likely have a negative impact on these farm workers.

With regard to the significantly elevated rate of MSFWs in the current sample who had blood hemoglobin levels falling below the cut-off point for iron-deficiency anemia, interventions aimed at reducing food insecurity and improving diet quality is critical. Given that food insecurity for MSFWs has been found to be prevalent across the country (Wirth, Storchlic, & Getz, 2007; Cason et al., 2004; Hill et al., 2011), prevention efforts should be directed at national levels. Expansion of the H-2A visa program, which stipulates the provision of meals to farm works, may be a promising avenue for not only increasing food security in this population, but for increasing diet quality as well. Additionally, policy efforts could also be directed at finding collaborative solutions with growers for reducing food insecurity among workers. Notably, growers typically prohibit MSFWs from bringing produce home from the fields citing reasons such as concerns about food safety, farm workers re-selling products at lower prices, and associated costs with monitoring what workers take (Wirth, Storchlic, & Getz, 2007). Targeting national and local efforts on growers to allow more farm workers to bring home food for

personal consumption could have an immediate positive impact on farm worker diets. Culturally sensitive interventions such as the “*Nutritional Promotora*” program that was developed by health educators at Wake Forest University, that take into account language, immigration status, poverty, and lack of familiarity with U.S. foods and food programs could also prove useful in addressing food and nutrition issues within this population. Furthermore, in a study on MSFWs diet quality, low knowledge of preparing healthy food was a barrier to nutritious eating frequently cited by men (Wirth, Storchlic, & Getz, 2007). Given that the majority of male MSFWs in national estimates and most of the MSFWs in the current sample come to the U.S. unaccompanied, it is possible that these men are not accustomed to cooking for themselves and do not know how to prepare healthy food. Thus, nutrition education efforts targeting unaccompanied male farm workers could have especially positive impacts on their diets and nutrition.

Notably, although it is useful to focus intervention efforts at the individual level to help reduce distress and increase well-being, a broader focus on eliminating the multiple layers of stress in this population is crucial to the sustained health of MSFWs. Making the public more aware of how MSFWs are exploited would also help. Oxfam America (2004) published a study entitled, “Like Machines in the Fields: Workers without Rights in American Agriculture”. This report documented how large grocery chains, fast food restaurants, and other large multinational produce purchasers exerted tremendous pressure on tomato growers to sell their products at very low prices. The growers then passed along the pressure for maximum production at the lowest possible cost, and all of the threats to health and safety this entails, on to the farm workers. One organization pressing for better working conditions and higher wages for MSFWs is the Coalition of Immokalee Workers (CIW). One of the CIW’s programs, the Campaign for Fair

Food, is attempting to influence the purchasing power of large food buyers to voluntarily agree to pay MSFWs one cent more per pound for tomatoes, guarantee that this penny passes down to the MSFWs, and implement a code of ethical practices throughout their supply chains (CIW, 2011).

Public awareness campaigns aimed at detailing the stressors and exploitation faced by MSFWs and the sad irony of food insecurity and poor diet in a population surrounded by food are needed to continue to bring attention to this seemingly “invisible” population. Additionally, policy advocating for increased resources and funding, especially for MSFW mental health care and longitudinal research, is paramount.

Limitations and Future Directions.

The results of this study need to be considered in the context of their limitations as well as their potential to guide future studies with this and similar populations. First, the cross-sectional design of this study precluded the examination of causal relationships. However, in concert with findings from other MSFW studies, the results of this study underscore the importance of conducting longitudinal and prospective cohort studies aimed at documenting the long-term, adverse effects of stress on MSFW physical and psychological health within and across agricultural seasons. Utilizing these types of research designs can further inform future intervention efforts and policy development.

Second, given the relatively small, regionally-specific, convenience sample, the generalizability of study results may be limited. In addition, the method used to recruit this sample may have resulted in some biases. For example, farm workers living in the most geographically (e.g., hidden camps far from paved roads) and socially isolated places (e.g., employer limited access) were less likely to be included in this sample. Given the important

prevention, intervention, and policy implications of this study's findings for Georgia MSFWs, future research is needed to increase generalizability by replicating study findings across national samples of MSFWs. Furthermore, increasing research efforts to include harder-to-reach workers will provide a more accurate understanding of the physical and psychological health of this population in its entirety.

Future studies of this kind could also benefit from a more focused investigation using more extensive measures that can be compared across studies. Nevertheless, the broad scope of the current study was important in that it began building a larger knowledge base of an underserved and understudied population of Georgia MSFWs. In addition, given that several of the men indicated that they enjoyed sharing their experiences through their participation in the current research study, future studies examining health outcomes could also utilize qualitative or participatory action research methods to further explore health functioning from the perspective of the workers themselves.

Finally, the current study examined only individual-level risk, asset, and protective factors. The finding of significant differences in stress levels between camps, with no other study variables accounting for the difference suggests that there are likely intra-camp differences that systematically and differentially impact workers. For example, differences between groups could have been related to the gender makeup of the camp site. Notably, the camp site that reported higher levels of stress was comprised of only male workers whereas the other two camp sites with comparatively lower rates of stress, housed and employed both men and women. In addition to camp-gender makeup, there are likely other intra-camp differences that systematically and differentially impact the workers. As such, future research should aim to not only examine individual level variables (e.g., PWB and farm worker expectations), but systemic variables (e.g.,

camp gender makeup, H-2A status, cultural processes, immigration reform, political climate, policy development, etc.), that protect against poor health outcomes in this population. A greater understanding of the multiple embedded layers of risk and protective factors for this population will have direct implications for improved healthcare and social service interventions as well as policy efforts. Drawing from ecological (Bronfenbrenner, 1988; Cicchetti & Lynch, 1993; Luthar et al., 2000) and intersectional theories (Crenshaw, 1994; Dill & Zambrana, 2009) may prove especially useful to more fully capturing the experiences and lived realities of this population. The broader, more comprehensive lens of these theories will likely prove helpful in examining how the many ecological layers and intersecting identities impact the biomedical and physical health of this population.

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